
UNITED STATES NAVY

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Submarine Base,
New London, Conn.
Dec. 9, 1918.

A B C D E F G H I J K L Mc

Blinker.

E .
I ..
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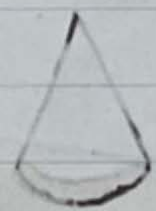
Dec. 9th, 1918.

Signals.

To call - Prefix (....-) and call letters.
To answer - Make own call letters.
Message - Letters follow (---.) if spelled out.
Signals (..--) if code.
Indicate kind of message (..--..) if unofficial.
If official - send serial number - and own call.
Number of words - (No.) (.--.-.. ...)
w d s

Break -...-
Body of message
If signature make break (-...-) and (...-.-.)
s i g
End of message .-.-.
To acknowledge (.-.) and steady display.
Finish of work (...-.-).



A B C D E F G H I J K L Mc

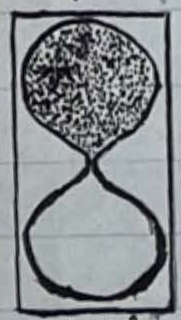
The Log.

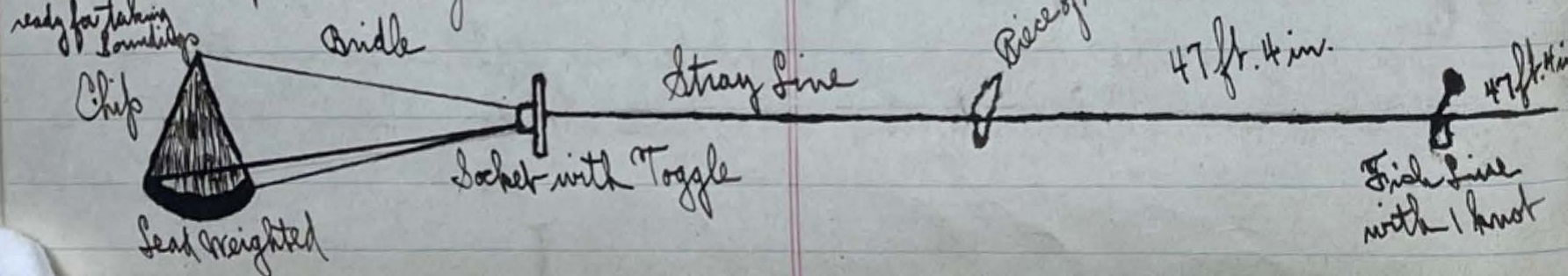
Kinds. Chip Log, Patent Log, Nicholson Log, Current Log and Ground Log.

The Chip Log consists of the log line, the reel on which it is wound, the chip which is weighted on its lower side to make it sit upright in the water, the long glass of 28 seconds, and the short glass of 14 seconds. The line is attached to the chip by a bridle, two legs of which are secured to the third by a plug and socket.

The log line is divided into distances, called knots which are subdivided into tenths of a knot; the length of a knot being 47 feet, 4 inches. These knots are the same portions of a sea knot that 28 seconds is of an hour. Therefore, every knot that runs out represents so many sea knots per hour that the ship is making.

Time glass





One man holds stray line and chip, another is at the reel containing line, and one man has the time glass. The first man, usually a quartermaster, takes the plug and fits it securely in its socket, gathers a small coil of line in his hand and sings out "clear glass. Man with glass answers "clear glass (if sand is in one bulb). Quartermaster then sings out "Stand by," throwing chip and coil over the lee quarter, clear of everything. When the red rag passes the rail the quartermaster sings out "Turn." The glass holder repeats this word and turns the glass until it is vertical, the sand end on top. When sand in upper bulb has all run out he calls "Up," at which time quartermaster holds the line and notes the mark nearest the taffrail. This mark will give the speed in knots. The quartermaster then gives the line a quick jerk, pulling out the plug so the chip will drag along the surface of the water, instead of vertically against it. Reel holders reel in the line and secure the reel.

The Patent Log consists of a rotator, or fly, a register, or dial, and a specially prepared cotton line about 150 fathoms long. The rotator is secured to the outboard end of the line. The dial registers the speed of the ship in knots and tenths of knots through the water. The rotator is towed astern and thus made to rotate with a velocity varying with the speed. The towing line is twisted by the rotator, and transmits its motion to a series of gears and dials which have hands like those of a clock to register the distance run in an interval of time. The log is usually fastened to the taffrail, or to a spar rigged out from the side of the ship to carry it clear of the current made by the propellers.
The Nicholson Log gives both the distance run and the actual speed at any instant.
The Current Log is the ordinary log and is used to measure the speed and the direction of the current.
The Ground Log is used to determine the speed of the ship over the ground. By attaching a lead to a log line in place of a chip, and heaving it

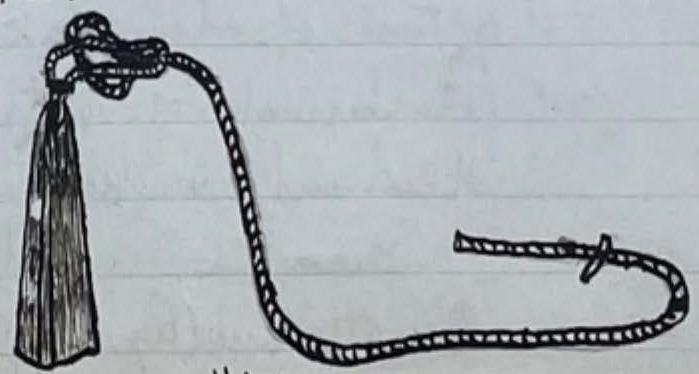
the usual way, and timing it with a glass, the actual speed over the ground may be determined. There should be sufficient stray line to reach the bottom before the glass is turned.

The Lead.

Kinds: The Hand Lead, deep-sea lead, and the sounding machine are used to obtain soundings. The drift lead is used when ship is at anchor.

Hand Lead: The hand lead line is marked as follows:

At	2 fathoms	2 strips of leather.
"	3 "	3 " " "
"	5 "	a white rag.
"	7 "	a red rag.
"	10 "	leather having a hole in it.
"	13 "	3 strips of leather.
"	15 "	a white rag.
"	17 "	a red rag.
"	20 "	two knots.
"	25 "	one knot.
"	30 "	three knots
"	35 "	one knot.
"	40 "	four knots.



HAND LEAD

These are known as the "marks." The numbers omitted, as 1, 4, 6, 8, etc. are called the "deeps." On the hand lead there are 9 "marks" and 11 "deeps." The leadsman sings out "by the mark 5," "by the deep 6," "and a half 5," "quarter less 13."

The hand lead varies in weight from 7 to 14 pounds. It is secured to the line by a piece of strong leather. Before marking the line is well soaked. The leadsman gives the lead a swing in order to throw it ahead so that the lead will be on the bottom by the time the line gets up and down. When the lead is on the bottom, and the line is up and down, the leadsman looks at the mark nearest the surface of the water, and calls out the sounding obtained.

Deep-Sea Lead.

The deep-sea lead (pronounced "dipsey") is a lead from 30 to 100 pounds in weight, with a line correspondingly heavy. It is marked at every 5 fathoms. At 20 fathoms there are 2 knots; 25 fathoms, 1 knot; at 30 fathoms, 3 knots, etc. There is a hollow in the lower end of every lead which, before use, is filled level full with tallow.

The hand lead is used when in shallow water. When coasting, or in deep water, the Sir William Thompson sounding Machine is used.

It is better than the deep-sea lead because it can be used without stopping, or slowing the ship, and it is more convenient.

Sir William Thompson Sounding Machine.

The Sir William Thompson Sounding Machine consists of a wooden frame bolted to the deck; the frame carries a drum upon which are wound several hunded fathoms of galvanized piano wire. The drum is controlled by a brake. A metal cylinder is attached to the end of the wire. Beyond the cylinder and connected to it by a short length of plaited rope is a heavy sinker. The metal cylinder carries a slender tube of glass, closed at one end and coated on the inside with a chemical substance which changes color upon actual contact with sea water. The tube is placed in the cylinder with its open end down. As it sinks, the water rises in the tube, and the air originally contained in the tube is compressed with a force which depends upon the depth, it follows that the compression of the air, and hence the height to which the water rises in the tube, becomes a measure of the depth. With properly coated tubes, carefully used, the limit of discoloration is marked by a sharply defined line, and the depth corresponding to this line is read off by means of a scale marked in fathoms.

G H I J K L Mc

In place of the chemically coated tube, a tube made of ground glass may be used. Ground glass when wet, shows clear. Consequently, a tube of this kind, if perfectly dry in the beginning, should give a clear record of the ground glass tube; it can be used an indefinite number of times, if thoroughly dried after each cast. Dis advantage of the ground glass tube; the height to which the water has risen is ~~not~~ so clearly defined as it is in the chemically coated tube, consequently the latter is easier to read and therfore more adaptable for night work.

The Drift Lead.

The drift lead is a lead which is used when a ship is at anchor, and there is any danger of dragging; for example, when there is a fresh breeze or a strong current. It is a heavy lead from 25 to 50 pounds in weight. It is placed on the bottom with considerable slack line. A man is detailed to watch the line. If the ship drags, the lead will remain fast on the bottom and consequently cause the line to tauten.

Nicholson Log. (Continued)

A vertical tube passes through the bottom of the ship and projects several inches below. The lower end of the tube is closed, but the water

enters freely through an opening in the forward side and rises - when the ship is at rest - to a level corresponding with the height of the water outside; that is with the waterline of the ship at that time. As the ship moves ahead, the pressure due to the "head" of water outside is increased by the pressure due to the speed of the ship; consequently, the column of water rises in the tube to a height that varies with the speed and which, accordingly may serve to measure the speed. Inside the tube there is a float attached to a chain that passes over a sprocket-wheel connected by means of suitable gearing with a pointer that indicates the speed as the float rises and falls with the water in the tube. A counter-weight at the other end of the chain balances the float.

The Compass.

The compass is an instrument by which a ship is steered on a given course. The compass card is mounted on a pivot in a bowl and the bowl is filled with alcohol. This keeps the card from wabbling or moving too quickly. Alcohol is used because it will not freeze. Instead of a single magnetic needle, there are four

K
L
Mc

bunches of needles contained in small cylinders attached to the compass card. The North point of the compass does not always point due North; the influence of the iron in the ship causes "deviation," but this is nearly all compensated by the correctors which are carefully placed, and should never be moved except by the officer who has charge of the compasses. Never have a knife or any other piece of metal in your pocket when you are near the compass.

The compass has 8 points in each quarter, equal to 90 degrees, making in the whole, 32 points, equal to 360 degrees of the horizon.

Since it is pivoted on a fine point, the motion of the ship when she swings does not affect it, but it continues always to point to the North, while the ships, and hence the binnacle and lubber's point, all swing around it and make it appear as if it were moving.

The Lubber's Point of a compass is on the inside rim of the chamber enclosing the card. It is a vertical line which shows the fore and aft line of the ship. This line is called the lubbers "point" and in steering, this line is made to coincide as nearly as possible with the given course.

(Cont. on page 105)

Ground Tackle.

Ground Tackle is a general term given to the gear used in anchoring and mooring ship. There are two kinds of anchors; old-fashioned anchor and the patent anchor. The advantages of a Patent anchor are:

1. They are housed in hawse pipes and held there by deck stoppers fitted with pelican hooks and turnbuckles. Consequently this dispenses with the operation of "catting" and "fishing" formally required to secure an anchor on the bill-board.

2. If used as spare anchors, they will stow more easily on the deck, as they lie flat.

3. They lie flat, with no long stock projecting; consequently, there is no interference with fire-gun, which is an important consideration of men-of-war.

4. There is less danger of fouling, due chiefly to the absence of a long stock.

Advantage of an old-fashioned anchor. Has greater holding strength than patent anchor of same weight.

The various anchors used aboard ship are:- Bower anchors, sheet anchors, stream anchors, stem anchors and kedge anchors.

Bowers.- The anchors carried on the bows. Two on each vessel.

Sheets.- Spare anchors about the size of the bowers. Sometimes two are carried; usually only one. As a rule they are carried on the bows on separate billboards, or in the hawse pipes.

Stream Anchors.- About one-quarter the weight of the bower anchors. Used for work too heavy for a kedge and not heavy enough for a bower.

Kedges.- Small anchors used for light work, such as warping and kedging. Two are supplied to each ship. They vary in weight from 100 to 900 pounds.

Warping is the name given to the act of hauling a ship around into a certain position by making the end of a line fast to an anchor, or to a secure hold ashore, and then moving the ship by hauling on this line.

Kedging is a term applied to hauling the ship ahead by planting light anchors ahead in succession and hauling up to them. As soon as the ship reaches the first anchor, it is weighed and carried ahead;

meanwhile the ship is hauled ahead on the second anchor.

A Mushroom Anchor is shaped like a mushroom, with a short shank coming up from the centre. It has no stock. Such an anchor is used for permanent moorings for a buoy. Submarines use mushroom anchors.

A Sea Anchor is a contrivance of large surface, with bridles, shaped somewhat after the fashion of an ordinary kite. When a ship is drifting, the sea anchor is put overboard with weight enough to immerse it and keep it upright. When ship drifts, the lines securing ship to anchor tauten, and the vessel is held head to the sea. The sea anchor has various forms. It may be made of spars lashed together and covered with canvas, by a frame like an umbrella, or even a triangular sail spread with a boom and having a chain around its lower edge.

Hawse holes are in the bows of a ship for cables to pass through.

Hawse pipes are steel pipes fitted in the hawse holes to take the chafe of the cables.

The Billboard is a shelf, or ledge, on the ship's side to support the fluke of an anchor.

Older ships were fitted with a timber (called cat-head) projecting over the bows to which the anchor was hoisted.

The ring stopper and shank painter are small chains secured on the forecastle of a ship. They hold the anchor on the billboard ready for letting go. The ring stopper passes out through ring and up to tumbler on deck. The shank painter goes out around the shank at throat of anchor and up to tumbler. By springing the trigger they are released at the same time, and both ends of the anchor go simultaneously.

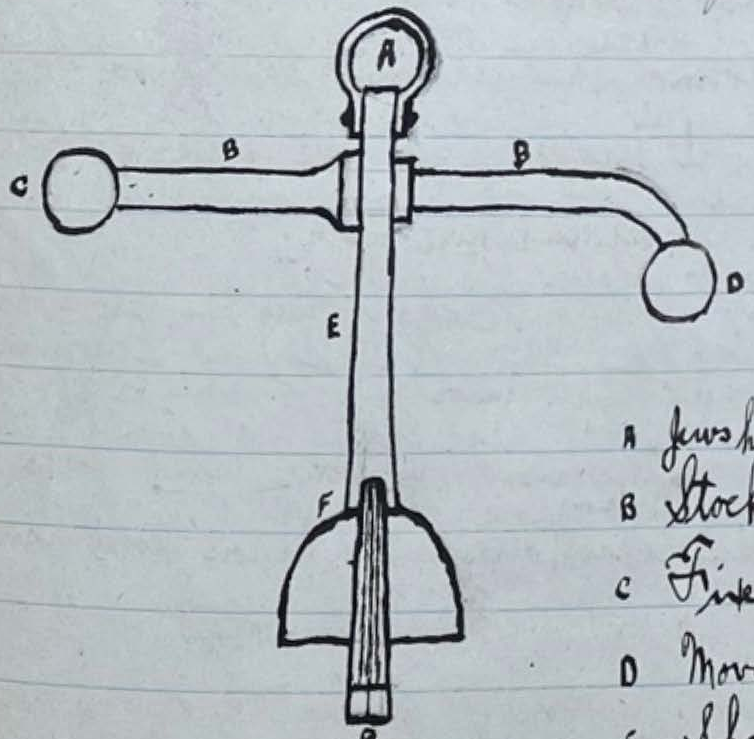
"Catting" an anchor means to hoist it to cathead and pass the ring stopper.

"Fishing" an anchor means to hoist the fluke of the anchor up to the billboard.

A Capstan is a barrel-shaped apparatus used on board ship for moving heavy weights, such as anchors. Parts are:- spindle, barrel, drumhead, pigeon holes, pawls, and pawl rim.

A Windlass is a machine for weighing anchor. It consists of one or more wildcats. The wildcats take hold of the chain with whelps, and, as the windlass turns, the chain is hauled in.

Chain cables are used in the Navy for anchoring. They are 120 to 180 fathoms long. They are made of appropriate size chain for the size of the ship, and are composed of shots of 15 fathoms each, with the exception of the first shot which is 5 fathoms long, and the second 40 fathoms. The shots of chain are connected together by means of shackles. A swivel is placed at the end of the 5 fathom shot. It prevents turns in the cable as the ship swings to anchor.

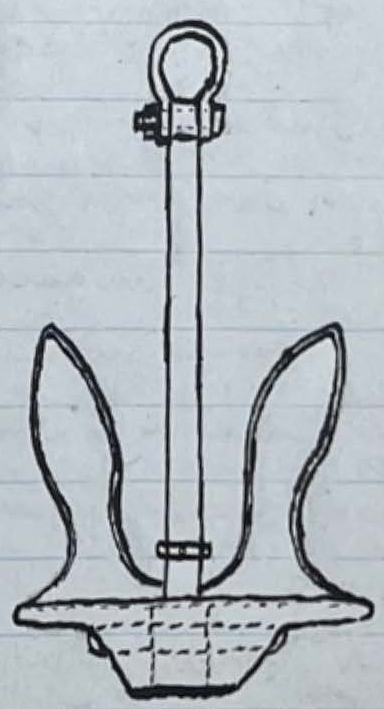


OLD FASHIONED ANCHOR

A Jews harp or ring.
B Stock
C Fixed Ball.
D Movable Ball
E Shank
F Fluke
G Crown

OPEN LINK

STUD LINK



PATENT ANCHOR

The following is an example of marking chain to tell length of cable out. At 15 fathoms; 3 links painted red. At 30 fathoms; 3 links painted white. At 45 fathoms; the third link on either side of the shackle is painted white, and 3 turns of wire are put on the stud of the painted link. At 60 fathoms, the fourth link on either side of shackle is painted white, and 4 turns of wire are put on the stud of the painted link. At 75, 90, 105, and 120 fathoms, the 5th 6th 7th and 8th links respectively are treated in the same manner as the 4th link at 60 fathoms, the number of turns of wire are 5, 6, 7, and 8, respectively.

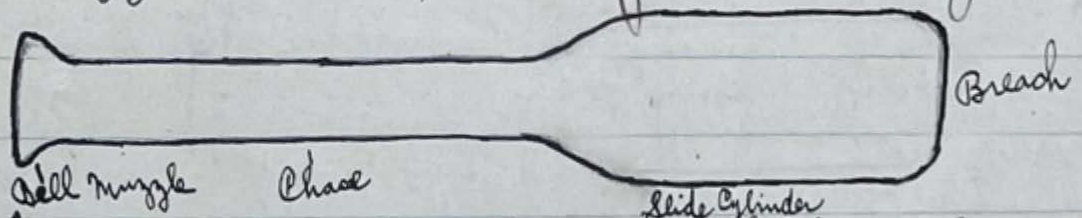
Mooring a ship means when she has two anchors down at a considerable distance apart with such a scope of chain on each that she is held with her bow practically in one place between the anchors, regardless of tide. When a ship is moored, she will swing practically about her own bow as a pivot; the extent of her swinging will depend on the tautness which she is moored. Mooring is resorted to when there is a limited amount of room for a ship to swing.

Ordnance and Gunnery.

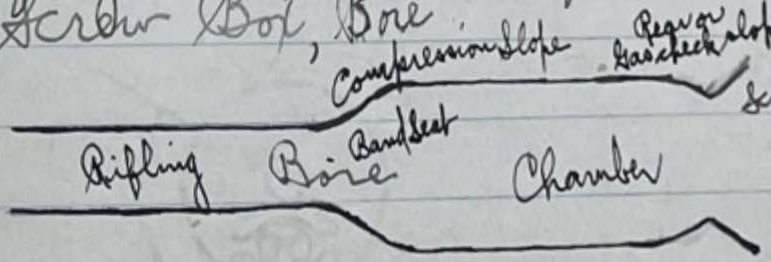
The construction of a gun is made of nickel steel.

Kinds. 1 B. L. R. Guns 3 Semi-Automatic 5. Machine Guns
2 Rapid Fire Guns 4 Automatic

Exterior Parts Bell Muzzle, Chase, Slide Cylinder or Rear Cylinder, Yoke, Breach



Interior Parts Band Seat, Rifling, Compression Slope, Chamber, Rear or Gas. Check Slope, Screw Box, Bore

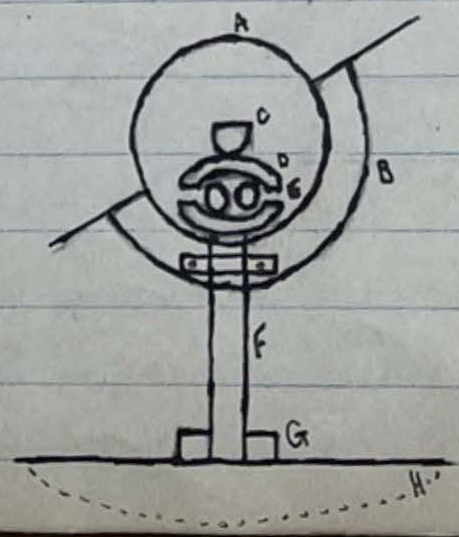


Kinds Ammunition
Separate - powder, projectile & primer are separate.
Semi-fixed - cartridge case, containing powder charge is separate from shell.
Fixed - shell, cartridge case and primer are all one.

Gun Mounts — Turret, Pedestal, Non-recoil, Field, Pivot and Broadside Mount

Parts of Broadside Mount — Stand, Carriage, Slide.
Recoil cylinders fitted to slide.
It has frictionless trunnion bearings and friction training gear, two recoil cylinders fitted with piston, piston rod and spring.

The frictionless trunnion bearing gives gun free & easy motion in elevation and depression. The weight of gun is lifted off trunnion seat to relieve friction. In centre of trunnion is fitted a lug rounded on underneath side.



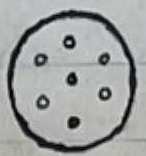
A. Trunnion
B. Trunnion Seat
C Lug.
D. Curved piece steel
E Ball bearings
F Bar
G Nuts
H. Spring Bar

Ammunition is, high explosives, loaded projectiles, powder in tanks and cartridge cases.

Shell rooms and Magazine rooms are situated below waterline and are watertight. Powder tanks must be closed when not used, and should not be dented which may allow escape of gases. Powder must not absorb too much moisture. A powder test must be taken at certain times.

Fixed ammunition is used up to 5" gun.
Semi-fixed ammunition used in 5" and 6" guns.
Fixed ammunition is put in a square wooden box.
The Primer set in the base contains fulminate of mercury cap which must be handled carefully. Projectile must be crimped in air tight in cartridge case.

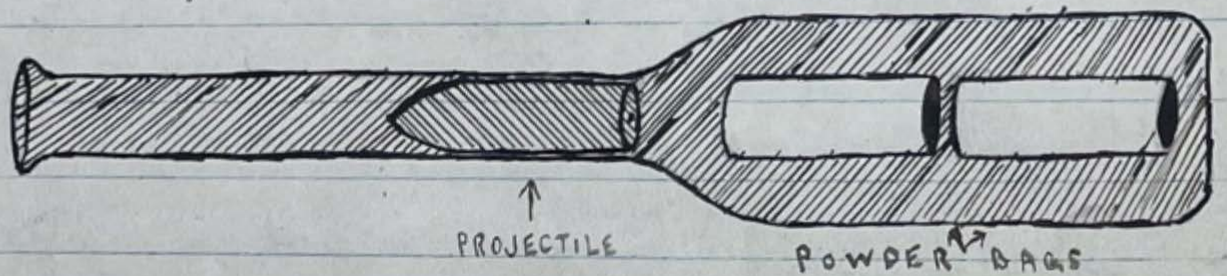
Smokeless Powder comes in grains, each one being perforated with seven holes in it

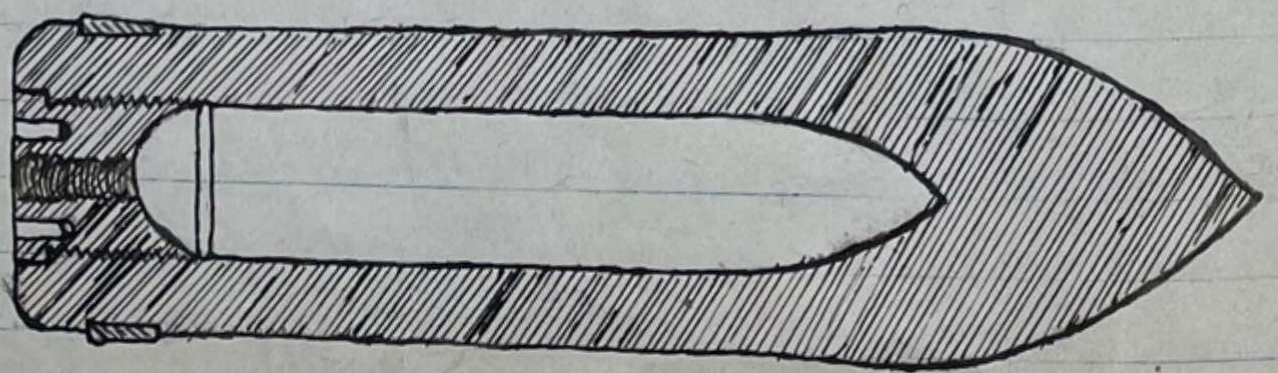


The Firing-Charge is the charge in the gun which, on firing, drives the Projectile from the gun. The firing charge is of smokeless powder.

The Ignition charge is in the base of the section of the firing charge. The ignition charge is of black powder.

The Bursting Charge is in the shell. It is of black powder, or of "Explosive D."





COMMON PROJECTILE

Gun cotton. The raw cotton is picked from the cotton fields, sent to the mills to be thoroughly cleansed and dried. Thirty pounds of cotton are put into 1500 lbs. of Sulphuric and Picric Acid for 20 minutes. The cotton is then boiled and cleaned for about 80 hours. It is then pulped and all the water removed. To 100 lbs. of cotton, 26 lbs. of alcohol is added. It is then sent to the mixing house where ether and dyfenoline are added to act as a stabalizer.

Primers.

Primers are used to fire the powder charge.

Kinds — Percussion and Combination Primer.

Detonaters.

Kinds. — Percussion and Electric;

Used to ignite the wet gun cotton.

Electric detonaters are used in mines and are operated from the shore.

Percussion detonaters are used in mines, submarine work, as torpedoes, that are exploded from contact.

Fuses.

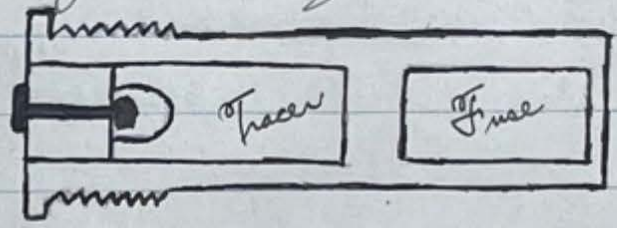
Kinds:
Ignition Fuse
Time Fuse
Delayed Action fuse

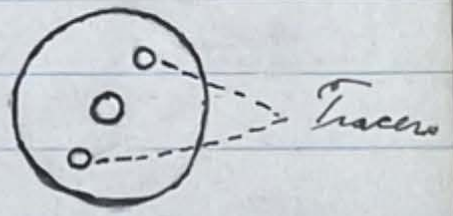
Fuse ignites the bursting charge in the shell.

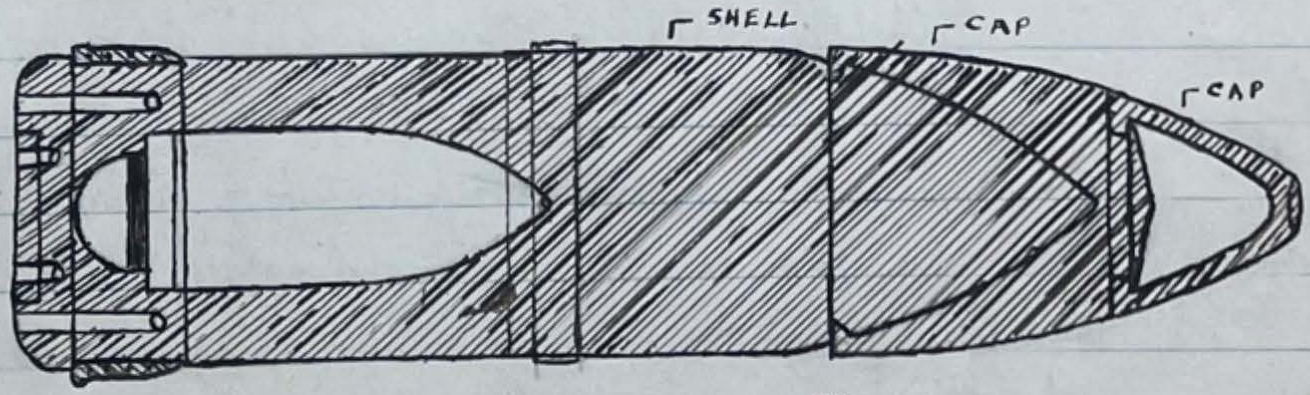
Detonating fuse or delayed action (delayed action) used in Armour piercing shells. Base Percussion fuse used in Common shell and sometimes in high capacity shells.

Time fuse used in Shrapnel, 15 sec and 21 sec.

Tracer fuse. The tracer compound is a slow burning compound producing yellow smoke by day and a flame at night.







ARMOR PIERCING PROJECTILE

Ordnance Material supplied to Submarines.

3 inch gun, mark IX supplied to submarines of the "Lake" type.

Characteristics of Gun

Length in calibres -	23 calibres
Muzzle velocity -	1600 ft. per sec.
Range -	5000 yds.
Ammunition -	fixed - Breach mechanism
Sliding wedge -	semi-automatic type.

Other material - machine gun .30 calibre, Lewis type, one or more guns; U.S. Magazine Rifles, model 1903, 30 calibre, from 10 to 15 according to complement of sub.; Colt Automatic Pistols, .45 calibre, 4 to 6 according to number of officers and C.P.O. Ammunition for these guns is carried aboard and separate from each other. Ammunition for 3 inch. guns consists mostly of shrapnel or high explosives. Number of torpedoes is according to number of tubes. As a general rule in war times sub. carries 8 torpedoes; 4 in tubes and 4 in racks.

Care and Preservation of Battery.

Guns should be moved daily, except Sundays and holidays, in elevation and depression. All parts shall be lubricated freely. No griddy substance should be used on working parts. Every gun must be washed out with fresh water after every firing, using bristle boze and chamber sponge, the breech being depressed for the purpose of letting water out. A hose may be used for this purpose. After being washed bore should be dried with sheepskin and then lightly oiled to prevent rusting.

All guns and mounts should be covered when not in use and during coaling ship, in rough weather or when ship is being painted.

When re-oiling always wipe off old oil first. Gas check should be protected from bad weather. Care should be taken in loading a gun not to dent or bruise the gas check slope. Breach mechanism

should be cleaned daily. Before firing dismount breach mechanism. The choke of a gun is when the inside of bore corodes.

Lewis Machine Gun.

Model 1917. Caliber .30

Modern machine guns are classified by feeding means, operating means and cooling means. The Lewis Machine Gun is magazine-fed, gas-operated and air-cooled.

The magazine is a circular drum in which the cartridges are arranged radially, bullet-ends toward the center. The magazine center has a deep spiral groove in which the bullet ends of the cartridges engage and by which they are controlled. The other parts of the magazine are rotated around the center during the operation of the gun, thus driving the spirally arranged column of cartridges down the helical groove of the magazine center until they are successively reached by the feed operating arm.

Motive power for the operation of the mechanism is obtained from gas pressure produced in the barrel by the exploding cartridge. This gas is taken through a hole near

Rack and Piston Group	14. Rack 15. Stricker	16. Stricker Firing Pin 17. Charging Handle	18. Piston Connecting Pin 19. Piston	
Receiver Group	20. Receiver Locking Pin	21. Ejector Cover	22. Ejector	23. Safety 24 Receiver.
Mainspring Group	25. Gear Casing 26. Gear Stop 27. Gear Stop Spring	28. Gear Stop Pin 29. Mainspring Collet Pin 30. Gear	31. Mainspring Casing 32. Mainspring 33 Mainspring Collet	
Guard Group	34. Guard 35. Butt Catch 36. Butt Catch Spring	37 Butt Catch Pin 38. Guard Side Piece (right) 39. Guard Side Piece (left)	40 Sear 41 Sear Spring 42. Sear pin (used also for Trigger Pin)	43. Trigger
Feed Mechanism Group.	44 Back Sight Axis Pin 45. Back Sight Axis Pin Washer 46. Back Sight Axis Pin Split Lock 47. Back Sight Bed Spring 48. Feed Cover	49. Stop and Rebound Pawl Spring 50. Stop Pawl 51. Rebound Pawl 52. Back Sight Leaf 53. Back Sight Elevating Screw		

54. Back Sight Slide
55 Back Sight Elevating Screw Head Spring
56. Back Sight Elevating Screw Head
57. Back Sight Elevating Screw Head Pin
58. Cartridge Guide
59. Feed Operating Arm
60. Feed Pawl
61. Feed Pawl Spring.

Bolt — 62. Feed Operating Stud 63. Bolt 64. Extractor

Butt Stock — 65. Butt Stock (assembled) 66. Butt Plate 67. Butt Plate Screw. 68. Butt Tang Screw.

Spade Grip & Magazine Filling Handle. — 69. Spade Grip (assembled)
70. Magazine Filling Handle.

Bipod Mount — 71. Bipod Mount (assembled)

Backward Action

Action of Gas — Operates Piston and rack.

Piston and rack — Mainspring and stopped by butt tang.

Action of	Operates.
Striker Post	Unlocks Bolt and carries it to the rear.
Bolt	Extracts empty shell, operates feed operating arm, ejector, stopped by butt tang.
Feed operating arm	Rotates magazine, releases (right) stop pawl, carries cartridge.
Magazine	Feeds cartridge onto feed arm and next one into position, forces (left) rebound pawl to rear.

Forward action.

Main Spring	Piston and stricker post.
Piston, rack & striker post	Bolt locked and round fired.
Bolt	Feed operating arm, cartridge into chamber, ejector.
Feed operating arm	Pawl over and behind projection, (right) stop pawl to the rear.

To fire

Gun will fire automatically as long as trigger is held back until magazine is empty. When trigger is released gun stops firing

The magazine holds forty-seven (two layers shells) cartridges.
Airplane type holds 97 cartridges, (four layers of shells).

U. S. Magazine Rifle.
Model 1903. Calibre .30

Calibre - .30 inch.
Weight - 8.69 lbs.
Weight of Bayonet - 1 lb.
Rifle and Bayonet - 9.69 lbs.
Length of Barrel - 24 inches
Length of Rifle - 43.4 inches
Parts - 93 - 93 parts
Bayonet - 10 parts
Sights - 6 sights
Rear or Leaf Sight
Twist uniform - one turn in 10 inches.
Trigger pull - 3 to 4½ parts.
Weight of bullet - 150 grains
Weight of powder - 50 grains
Weight of cartridge - about 395 grains
Rifling, number of grooves - 4 grooves
Depth of grooves 4/1000 of an inch.

1. Front Sight
2. Extreme Elevation
3. Field Sight
4. Triangular
5. Peep
6. Battle Sight.

Chamber pressure - 49,000 to 51,000 lb. to sq. inch.
Muzzle velocity. 2700 feet per second.

The Rifling gives a rotating motion to the sight. Prevents shell from tumbling. Every gun is fitted with either cpts parts, or cleaning gear. The Sling is used for two purposes; in artillery and for steady firing to reduce kick on shoulder. The pressure of burning gases eject shell from muzzle. The gas is forced out of gas vent or gas escape hole.

Windage: 1 point of windage. 100 yds. varies 4 inches, 200 yds, 8 inches. Sights graduate up to 2800 yds. Can be used up to 3000 yds.

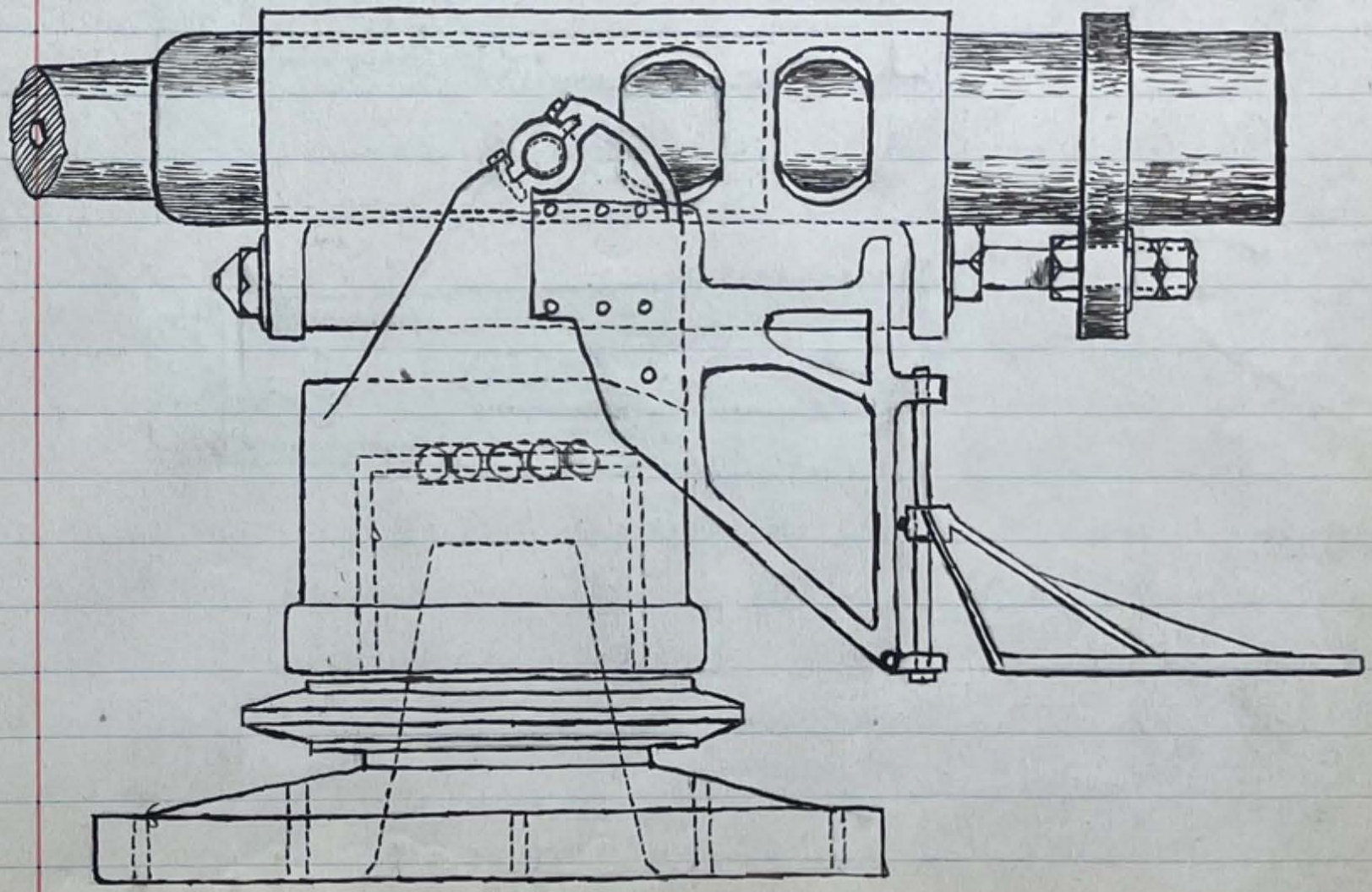
Parts:

1. Muzzle
2. Bore
3. Front Sight
4. Upper Band
5. Upper Band Screw
6. Bayonet Stud or Lug
7. Stacking Swivel
8. Stacking Swivel Screw
9. Stock
10. Hand Guard
11. Lower Band
12. Lower Band Screw
13. Lower Band Spring
14. Lower Band Sling Swivel
15. Thumb or Finger Groove
16. Sight groove
17. Rear or Leaf Sight.
18. Fixed Base
19. Movable Base
20. Leaf
21. Slide

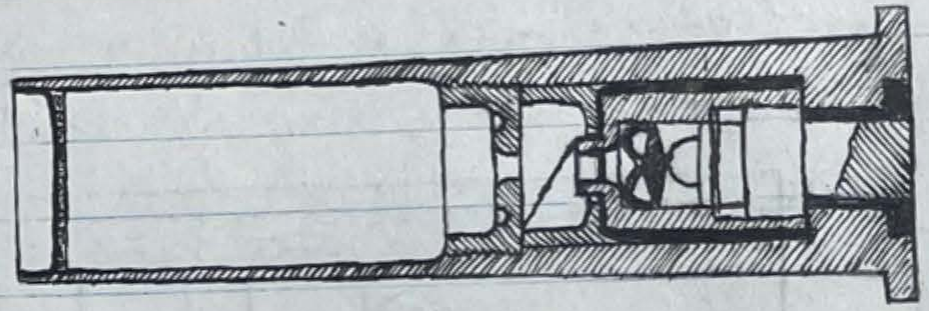
22. Slide Set Screw
23. Windage Screw
24. Receiver
25. Chamber
26. Gas escape Hole
27. Guard
28. Magazine Floor Plate
29. Trigger
30. Trigger Guard
31. Magazine Spring
32. Follower
33. Follower Rib
34. Bridge
35. Magazine Cut-off
36. Sear
37. Sear notch
38. Sear spring
39. Magazine cut. off Spindle
40. Ejector
41. Ejector Pin
42. Small of Stock
43. Combing
44. Toe
45. Heel
46. Butt
47. Butt Plate
48. Butt Plate Screws
49. Butt Sling Swivel
50. Sling
51. Bolt Handle
52. Safety Locking Lug
53. Locking Lugs
54. Extractor
55. Extractor Tongue
56. Gas Escape Hole
57. Extractor Collar
58. Extractor Slot
59. Striker
60. Main Spring
61. Firing Pin Collar
62. Firing Pin Sleeve
63. Bolt Lock
64. Safety Lock Thumb Piece
65. Safety Lock Spring
66. Safety Lock Pin
67. Firing Pin Rod
68. Cocking Handle.
69. Bolt Stop Pin
70. Bolt Stop Spring
71. Compression Slope
72. Rifling
73. Lands
74. Grooves

Parts of Bayonet

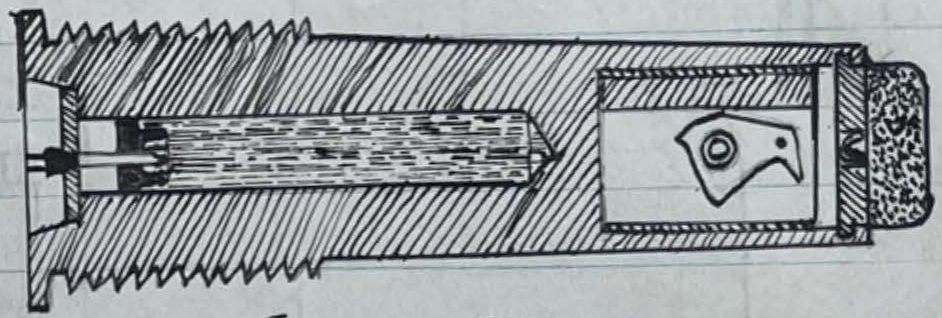
1. Blade
2. Guard
3. Barrel hole
4. Pommel
5. Grip
6. Lock
7. Spring
8. Screw
9. Undercut Groove
10 Scabbard Catch



BROADSIDE GUN-MOUNT.



COMBINATION PRIMER



TRACER FUSE

Gun Mounts.

A gun mount is more or less a stand to support the gun. It consists of the principle parts, namely, Stand, Carriage and Slide.

The Stand is that part of the mount bolted to the deck of the ship into which the carriage fits. The stand is fitted with a roller path into which conical rollers are placed and the bearing surface on the upper part of the carriage rests upon these rollers which give the carriage its free and easy motion in train.

The Carriage is fitted with a pivot arrangement fitting down into the stand and an annular groove on the lower part of the pivot allows the holding down bolts to take into the pivot and hold the carriage from jumping out of the stand during the firing. These bolts are entered through the stand and the number as a rule is eight. On some guns

they do not have these holding down bolts but instead have holding down clips. The carriage is that part of the mount which gives the gun its motion in train.

The Slide is that part of the mount into which the gun fits. The Slide fits into the carriage and is fitted with trunnions that rest in trunnion seats on the carriage. Cap squares are fitted over the trunnions and bolted down so that there will be no danger of the slide jumping out of the carriage during the firing. This is the part of the mount that gives the gun its free and easy motion in elevation and depression due to the frictionless trunnions which eliminate most of the friction.

Smokeless Powder

Smokeless Powder is a short fiber cotton which after being picked and dried is put through a series of processes and after being nitrated becomes what is called pyro or nitrated cotton.

It is then put through a process of drowning, then pulped which makes it a pulped pyro.

After the pulped pyro has went through the poaching, wringing, dehydrating and mixing it then becomes a nitro cellulose.

It is then put through the pressing process which afterwards is sent to the solvent recovery where it is left to partly dry out where the voalities are run off and through a pipe system into a brine system an condensed into a liquid form and saved.

After that it is sent to the dry houses where it is left until it is thoroughly dried out which takes from 2 to 4 months according to the condition of the powder. It is then sent to the blending house where it is blended, weighed, packed and made ready for shipment.

Smokeless Powder Tests.

Daily: Visual examination of the sample bottle. Observe for whitening of violet paper; specks on powder, and if nitrous fumes are present on first opening magazine. Also lay the hand on a tank here and there to see if there is evidence of heating.

Fortnightly: Inspect several tanks of each index in each magazine, taking different tanks at each inspection. As soon as the cover is off the tank stick the head in the top, and smell for nitrous fumes before they have a chance to dissipate if any exist. Then having gloves on the hand or a crash towel, so as not to touch the powder, take a scoop full and examine in a good light, to see if spotted or deteriorated. Hit two grains together to see if still firm. Observe the silk bag for nitrous discolorations which will be dark reddish brown. The green discolorations come from the tank.

Take the sample bottles in a good light and provide a suitable background and look for fumes. Also look for spots on grains.

Monthly: Each month all indexes that fail to stand up less than 30 days in the surveillance test are again subject to the surveillance test

Bi-monthly: All indexes that stood from 30 to 39 days.

Quarterly: All indexes that stood from 40 to 59 days.

Semi-Annual: All indexes from 60 +

Surveillance Test.

Surveillance Test

This test is conducted with a heat oven electrically regulated and heated, so as to maintain a constant temperature of 65.5 Centigrade. All indexes to be subjected to the test are put up in bottles about 3/4 full.

The oven is opened every 24 hrs. and each bottle is taken out and examined to see if nitrous fumes have developed. As soon as these are found to exist the contents of the bottle are removed and thrown over the side, and the number of days entered in the book. Indexes that stand up 60 days are marked 60+, and are tested again in six months.

Indexes that stand up 3 days or less may be regarded as dangerous, and a letter should be sent in to the Bureau for instructions as to their disposition.

30 to 39 days tested Bi-monthly.

40 to 59 days tested Quarterly.

Violet Paper Test.

Sample bottles with air-tight ground glass stoppers, are used for this test. The powder grains are put in the bottle and a piece of violet paper is placed on the top. The bottle is then placed in the warmest place in the magazine, and the number of days it takes to turn the paper white is the test.

16" and 14" 50 calibre	23 days
12" 45 cal. & 10" 40 cal.	21 "
12" 40 cal. & 8" 45 cal.	19 "
13" 35 cal.; 12" 35 cal. & 7" 45 cal.	18 "
10" 40 cal.; 8" 35 cal. 6" 50 cal.; 5" 51 cal. 4" 50 cal. Mark IX	17 "
4.7 and 4" 50 cal. Mark VIII	16 "
All smaller	15 "

The Recoil System of Broadside Gun.

All guns must have a means of checking the recoil and counter recoil in order that the guns do not leave the slide after being fired. This system consists of recoil cylinders that are either made in one with the slide or strapped onto the under part of the slide.

The cylinders contain liquid and springs with a piston rod fitted into each cylinder which extends out thru the rear end of the cylinder and through the yoke eyes of the yoke which is fitted to the gun and travels with the gun during recoil and counter recoil; lock nuts secure the piston rods to the yoke on each side of the yoke.

On the forward end of the piston rod either made in one or screwed onto it is a piston fitting flush against the inside surface of the cylinder and travels with the piston rod.

The forward end of the cylinder is closed up by a forward bonnet and the rear end is fitted with a rear bonnet

in which is fitted a recess to allow the piston rod to extend thru. This recess is threaded so as to receive a stuffing gland that is fitted over the piston rod in order that the liquid in the cylinder may be held from escaping.

The inside surface of the cylinders are fitted with annular grooves and the cuts or grooves are deeper at the forward end than at any other part. The grooves have a pitch to them similar to the rifling in the gun and they get smaller to the center gradually decreasing to zero. The number of grooves depend upon the size of gun; they are as a rule from 3 to 5 in number.

The springs are in sets and are either double or triple sets depending on the size of gun and in minor calibre guns they are single sets.

These springs are separated by heavy steel discs called separating discs and keep the springs from catching with each other & tangling up together. The main object is that the short sets give better results and a greater tension can be gotten and at the same time if one set breaks the others are sufficient to do the work.

These springs are under initial tension at all times in

order that the rolling of the ship in heavy seas will not allow the gun to come to the rear out of Battery. The recoil is checked as follows:

When the gun is fired the force of the explosion inside forces the gun to the rear and the yoke being made fast to the gun and travelling with it tends to draw the piston rods to the rear which in turn draws the piston forward. Now the cylinders are primed or filled to the brim with liquid at all times and as the pistons are drawn to the rear the liquid has to move somewhere to allow the pistons to move to the rear, so the liquid is forced from the rear end of the pistons out and around the pistons thru the annular grooves in the cylinders to the forward end. At the beginning of the recoil the liquid can flow more freely out around the pistons due to the fact that the grooves are deeper and as the pistons travel further to the rear the grooves taper down and check the flow of the liquid at the same time the springs in the cylinders are

being compressed to a high state of compression which work in conjunction with the liquid and help check the recoil. Now after the gun has recoiled to its maximum it has to be returned to battery and this operation is performed by the expansion of the springs to their normal state. The return of the gun to Battery is called the counter-recoil and in this operation the springs perform it all and this time instead of the spring working in conjunction with the liquid they work just the very opposite; (against them) and there has to be a means of checking the slamming of the gun into battery as we know now that the annular grooves taper to the center and it is very evident that as the pistons travel forward during the counter recoil the amount of liquid flowing from the forward end to the rear end of the pistons increases and if there wasn't some means of checking this the gun would be very apt to slam into battery and loosen different bolts and screws knocking your telescopes loose and throwing

off your line of sight and consequently disabling the gun; so the forward bonnets are fitted with what is called dash pots and on the forward end of the pistons extensions of the piston rods are fitted and when the gun is returning to battery these extensions project into the recesses in the forward bonnets or dash pots and the liquid in them is forced out by the extensions as they cushion themselves, thereby taking up the shock of counter-recoil.

These extensions are called counter recoil plungers and the recesses in the forward bonnets which are cup shaped are called dash pots.

In some of the smaller guns spring buffers are used to take up the shock and the spring buffers are inside the cylinders at the forward end.

Note: Between the two cylinders is fitted an equalizing pipe and the object of this pipe is to equalize the pressure of the two cylinders so that one cylinder will not get more pressure

exerted upon it than the other.

The cylinders are fitted with filling plugs on the upper side and drain plugs on the under side.

The springs, pistons, and piston rods should be taken out and overhauled once a year.

Markings of Projectile.

The major caliber projectiles are marked as follows: on the base, with the name of the manufacturer, lot numbers and date of specification and weight; on the rotating band, with the initials and stamp of the inspector of ordnance, caliber, kind (A.P.F.S.) mark and modifications.

The minor caliber projectiles are stamped on the case with the name of the maker and the lot and year of their specification, and on the band, with the inspectors initials.

The exterior of projectiles (excepting the rotating band, base and bourrelet, fuse, and the ogival from the nose to the bourrelet) is coated with a thin, hard smooth paint of the following colors respectively:

Armor Piercing	Black
Common	Lead color
Shrapnel	White
Blind	Red

Target projectiles are painted red on the ogival only; the rest of the projectile is vaselined.

Projectiles for fixed ammunition are not painted in rear of the rotating band but are given a thin coat of vaseline or heavy grease.

The bursting charge of all projectiles is indicated by painting the ogival a distinctive color for one caliber's distance from the nose toward the bourrelet.

Projectiles loaded with black powder have the nose painted lead color.

Projectiles loaded with explosive "D" have the nose painted yellow.

Projectiles blind-loaded have the nose painted red.

Projectiles fitted with night tracers and tracer fuses, have a white band one inch wide painted around the ogival just below the color indicating the bursting-charge.

Torpedoes.

Bliss-Leavitt Mark VII. Mod. 1

Part 1.

Collapsible Exercise Head.

This is a dome shaped head of sheet steel, strengthened by several rings and bulkheads, riveted and sweated to it. Four circular holes are cut in the shell and replaced by four metal patches sweated in place.

The after end of the head is closed by a bronze bulkhead which carries a cork dummy, and is made water-tight by seating against a rubber gasket, a lead weight is secured to the shell at the bottom for ballast forward of the weight is located the oil trace compartment which has two valves, one an inlet valve to admit water in the bottom of the tank and one in the top to let the oil escape showing the track of the torpedo.

On the top near the after end of the head is located the pot for the chemical tracer, which upon coming in

contact with the water forms a gas that burns and leaves a blue smoke, giving the location of the torpedo at the completion of its run.

The head is brought up to weight by filling with water, the total weight is 277 lbs.

The collapsible head upon striking the side of a ship collapses due to the metal patches being forced out by the water in the head being incompressible, thereby preventing harm being done to the ships side when torpedo strikes.

Air Flask.

The air flask is a hollow forged mild steel cylinder 7 ft. 9¾" long and 17.781" in diameter, the flask thickness is .348", except the belts under the guide studs which are .5"; about 7½" of the after end of the flask forms the water compartment which is .25" thick.

Three rings are left in the flask when boring,

these rings form the seats for the heads, two for the flask heads and one for the water compartment bulkhead. The flask is drained through a small line which goes through the after bulkhead to a small casting in the water compartment and then to the atmosphere.

Water Compartment.

The water compartment is closed by two bulkheads the forward one is the after head of the air flask, the after end is closed by the water compartment bulkhead proper, this head is held on its seat by sixty screws, and has numerous openings for pipes and stays.

The fuel compartment is carried on the forward side of the water compartment, it is held in place by three brackets. It is a brass casting and will not stand much pressure. The fuel flask has three openings one for filling one for the admission of air and one for the fuel to pass through to the fuel spray.

The test pressure for the fuel compartment is 15 lbs. per square inch.

The water compartment pressure for testing is 500 lbs. per sq. inch.

Midship Section.

The midship section is a short steel cylinder, riveted and sweated to the after end of the air flask, the after end having a composition ring sweated and riveted to it. It contains the valve group, combustion flask air checks and fuel and water checks with their different leads. Access to the different connections is had through openings in the midship ring. Water also circulates through the midship section cooling the combustion flask preventing it from overheating.

After body.

The after body is made of sheet steel and is secured to the midship section by a composition joint ring. It contains the main engine, depth mechanism, starting and distance gear, engine oil pot, gyro mechanism, and air

stamped casting. The forward end is closed by the engine bulkhead, and the after end is closed by a permanent bulkhead with six openings. The six openings are used for the following, main shaft, two rudder rods two exhaust valves, and an opening for the oil lead to the tail bearing. The openings for the main shaft and rudder rods have packing glands to make them water-tight. The exhaust valves have ground seats. On each side of the afterbody is located a handhole plate to give access to the different mechanisms.

The handhole plates, starting and distance gear and gyro mechanisms are made watertight with vulcaboston gaskets. The forward bulkhead is made watertight with a vellumoid gasket.

Tail

A steel tail shaped like a frustrated cone is secured to the afterbody by joint screws. It is fitted with four blades, two vertical and two horizontal, and carries

the rudders and their connections, the propellers and their sleeves, and a thrust bearing. The bearing is oiled by an oil cup and gravity lead from the engine oil pot.

Valve Group.

The valve group is in two units, the first unit secures to midship ring and consists of the stop and charging valve. The stop valve is for the purpose of confining the air to the air flask thus making it possible to disassemble the other parts of the torpedo.

It consists principally of the valve body, valve and carrier to which it is swivelled, the spindle, plug and follower and their respective washers.

Charging Valve.

The charging valve body is cast in one with the stop valve body; it is fitted with a check valve to prevent the air from escaping when removing the wing nut after charging the torpedo. It consists of the following parts, check valve, spring and guide tube, valve plug and washer.

Starting Valve.

The starting valve is in the second unit which is carried on the turbine bulkhead and also contains the first and second reducers and differential or restriction ring. The starting valve assures the automatic starting and stopping of the engine when the starting lever is thrown to the gear, or when the governor or distance gear functions, the action is as follows: when the stop valve is opened flash air pressure passes through legs up to starting valve and works on the upper and lower surface of a groove cut around the valve just above the valve seat. The area of the upper side being greater than the lower, the valve would lift but for the fact that a small passage drilled through the valve allows the air to bank on top between the top of the starting piston and the top of the starting valve.

The action of the starting valve is as follows: when starting lever is thrown to the gear the air on top of the starting valve escapes by the starting piston allowing

the flask pressure air under the starting valve to lift the starting valve up against the spring pressure on top forcing the valve against its upper seat, holding it there until torpedo has finished its run, then the following happens; the distance rider trip withdraws the stop plug from under the starting piston allowing the piston to return to its seat; the air then banks upon top of the starting valve, the air and spring on top working against the air pressure on the bottom of the valve force it to return to its seat cutting off the air.

The principal parts are valve body, valve packing rings, lock nut, starting valve spring and connections.

First Reducer.

The reducing valve bodies are cast in one with the starting valve body. The first reducer receives the air from the starting valve at flask pressure and reduces it to 600 pounds. It consists principally of the valve and spindle in one piece, spring, upper and lower spring buttons, spring barrel and plug for top of valve body.

The spring tending to open valve is opposed by the air pressure

tending to close it, thus at the start of the run the valve opening is smaller than at the finish.

Second Reducer.

The second reducer is similar to the first, except that the spring pressure is regulated by means of a speed screw. The speed screw screws into lower end of the spring barrel and impinges on the lower spring button, thus putting tension on the spring. The speed ring encircles the speed screw and is held between the flanges on the screw and the spring barrel making the joint tight. Three speed rings are furnished with each reducer, each is marked with speed and size of ring.

Restriction Ring

Air from the second reducer usually about 480 lbs. passes into the differential restriction chamber, then from the chamber it passes through the restriction ring, and is restricted to 440 lbs. Air at 440 lbs. from the restriction chamber passes through a lead to the fuel and water compartment forcing over the fuel and water to the combustion floor; the

fuel leaving the spray is ignited by a quick burning fuse; this in turn heats the annular evaporates the water making steam.

Combustion Flask.

The combustion flask is made of drawn steel, coppered over to prevent rusting. It is made in two parts screwed together and the joint is made tight by a lead ring held by numerous compression nuts.

The nozzle and pistol casing are screwed and sweated in place to prevent leakage. A nipple for the steering engine air strainer lead is also sweated in the top of the flask. A seat for the main air connection is ground to prevent leaks. The fuel and water spray holders screw into the top of the flask and can be removed at any time.

A baffle plate in the top of the combustion flask spreads the air preventing it from blowing out the fuse. The plate also has openings for the spray holders and pistol case.

Pistol.

This type of pistol consists of a casing machined at its lower end to hold a fuse casing, and closed at its upper by a plug

It carries a striker which is held away from the fuse by a light spring. The casing has four small holes at the top which admit air to the top of the striker when the starting valve is opened forcing it down against the fuse firing it.

Check Valve Manifold.

The air from the restriction chamber passes through the air check manifold before going to the top of the fuel and water compartments. It is secured to the two nipples fitted to the water compartment bulkhead and is accessible through the midship ring. It consists of the body containing the two valves with the plugs, seats and springs. The fuel air check should lift at 20 lb. pressure, the water check should lift at 35 lb. pressure. In the plug, a shoulder is left for seating a celluloid washer to prevent any pressure or water from entering while the torpedo is laying in the tube. Some of hard grease is also put over the celluloid washers. When the torpedo is fired these washers are blown out by the air pressure when the valves unseat.

Fuel and Water Check.

Fuel and water check valves are located on the underneath side of the torpedo. An opening in the midship ring gives access to the manifold. The casting carries the two check valves and a strainer for straining the fuel. An opening is left in the plugs for inserting the eye rod for testing the checks to see that they are on their seats before filling the two compartments. The fuel check should lift with a 40 lb. pressure. The water check should lift with a fourteen lb. pressure.

The Starting and Distance Mechanism.

The starting and distance mechanism is assembled in one unit with the governor mechanism. The starting piston is carried on the starting button which is engaged by the forward end of the trip lever; the forward end of the trip lever engages in the starting button, the center is pivoted and the after end is engaged by the trip cam; when the starting lever is thrown to the rear, the trip cam on its forward end forces back on trip lever, which raises forward end, thus raising

starting piston and button; this allows the air banked on top of piston and valve to pass by and into the air chamber. the starting button is held up by the lug on the stop plug which is forced forward by spring pressure.

The Distance Mechanism

The distance mechanism receives its motion from the propeller shaft through the upper spur gear and floating shaft which drives the governor shaft. The motion of the governor gear is transmitted through worms to a worm wheel. A ratchet wheel secured to the worm wheel gives motion to the ratchets, as the distance gear spindle is secured to ratchet arms all revolve together until the zero point is reached, when the distance stop on the ratchet arm has engaged the lug on under side of stop plug and forces it aft allows button and piston to be seated; the air will then bank up and seat the starting valve.

The Governor Mechanism.

The governor mechanism consists of a casing built around the governor shaft. It houses two knives which are held in by springs which engage their toe on lower end. If the engine should race the centrifugal force will cause the knives to fly out and cut the governor link. This link serves to hold the governor lever forward against its spring pressure, and when cut allows spring to force lever aft. On the opposite side of the frame the stop lever is attached to the governor lever shaft. Its toe engages stop plug, drawing it aft, and causes same result as distance gear.

The Main Engine.

The main engine consists of two turbines driven by superheated air and steam. The first turbine screws to the top of the pinion sleeve which is carried between the middle and upper bearings in spindle casing.

(The middle bearing contains 13 ball bearings, the upper 16). The second turbine is carried on a spindle

which passes through the first turbine and pinion sleeve to the lower end of casing, its height being adjusted by the lower ball race. (The lower bearing contains two sets of 12 ball bearings). A pinion keyed to turbine spindle, also the pinion sleeve, drives the two main driving gears. These are carried on a cross head and secured between the "A" shaped frames of the engine. Bevel gears are secured to inside of main driving gears and engage the bevel gears carried one on each propeller shaft. The after propeller shaft passes through the forward propeller shaft and cross head. Suitable bushings are provided at these bearings. The propellers are carried on hubs secured to propeller sleeves which key to the propeller shafts at the tail. The thrust of the after propeller is taken up by a ball bearing placed between cross head and turbine spindle casing. The casing is secured to the "A" frame which in turn are secured to the forward bulkhead of after body. Two ducts carry the engine exhaust to the

exhaust valves secured to the after bulkhead of the afterbody. A strut secures the after end of the "A" frames and carries two spur gears driven off the gear on the propeller shaft and is connected by a floating shaft to the distance gear unit.

The lower spur gear is smaller and drives the pallet mechanism mounted on gyro housing.

Lubrication System.

A three cylinder pump is secured to lower "A" frame. It is driven by the worm nut on lower end of turbine spindle. Pazus or some other hot running torpedo oil is drawn from the oil pot secured to the shell of the afterbody and delivered by the first piston up through the turbine spindle lubricating the bearing surfaces around pinion sleeves and bushing by means of the oil grooves and holes. The second and third pistons pump the oil up through the cross head holding bolt, lubricating the cross head & bearings.

Oil Pot.

The oil pot is secured to the top of the afterbody shell, riveted and sweated. The oil pot holds 4.75 pints. This pot is

divided into two compartments by a bulkhead perforated at the top. The after compartment consists of one third of the capacity of the pot. The oil is carried by gravity, which is assisted by air pressure in the afterbody, to the tail bearing.

Propeller Connections.

The forward propeller shaft is packed with a felting and a bronze packing nut at the after end of the afterbody bearing.

The after propeller shaft runs on a composition bushing inside of forward propeller shaft, and is packed by a composition washer and hard grease (Albany Grease) to prevent entrance of water. The afterbody bearing, bushing and propeller shafts are oiled by gravity feed from the oil cup secured to afterbody shell above the water service, consisting of an intake scoop (facing forward) secured to the top of the afterbody shell, and a shell and discharge scoop (facing aft) secured to the bottom of the shell.

The after propeller sleeve takes up against the shoulder and is keyed to the shaft, and is prevented from backing off by a lock nut. The forward propeller sleeve is fitted in the same manner,

but it is prevented from backing off by the shoulder taking up against the ball bearing in the tail.

The entrance of water between shafts is prevented by forcing Albany or similar grease in between shafts. This is done by means of tool 206 afterwards replacing packing plug using tool No. 184. Oil holes and circumferential channels are cut on bushings and bearings to permit the free flow of oil.

The Depth Control Mechanism.

It consists of the pendulum and hydrostatic piston and immersion chamber, the depth engine and depth indexes, gudders with their connections. The pendulums consists of a composition casting filled with lead. It is swung in the wake of the main engine, being suspended by two hangers which are pivoted in a fitting riveted and sweated to the after shell.

Hydrostatic Pistons.

It is carried in the immersion chamber secured to the forward part of gyro housing. It consists of a spring balance which rests on a piston stem. Spring pressure is exerted on either side of

spring balance the tension being regulated by the depth rudder. The diaphragm yoke is carried under hydrostatic piston and moves up and down with it. The travel of the yoke is limited on its forward end by the diaphragm stop. The after end is secured to the yoke shaft to which the lower end of the diaphragm lever is secured giving a bellcrank motion. To the upper end of the diaphragm lever, a valve lever is pivoted its lower end being engaged by the pendulum connecting rod, the upper end carries a link and pin.

Depth Engine.

The depth engine is secured on the gyro housing and consists of a cylinder of composition metal in which the piston travels. The movement of the piston is caused by air in one or other cylinder head. This air is controlled by a valve which moves forward or aft in the piston. The control valve is secured in its forward end to the valve link and thus moves forward or aft with it the piston also moves in the same direction as the valve, when air is turned on. The rudder rod secures to the after end of the piston stem and

transmits the movement to the bell crank in tail. The rudders are connected to bell cranks and are thus moved up or down. The air to the steering engine comes from the top of the combustion flask also the exhaust of the starting gear passing through an strainer. The depth index is secured to the top of the after body shell, the index spindle being accessible from the outside the movement of the spindle is transmitted through two side gears and spindles. By means of the eccentric shank on spindles and a fine pitch gear the index motion is greatly reduced.

Locking Mechanism.

The rudders are locked by means of a fork which engages the pin on the valve lever. The fork is adjusted for positioning the bell crank the lower end of the bell crank engages the locking bar slide which has a reciprocating movement in side of housing the slide spring tends to hold it off, but is overcome by a lug on duration spindle by engaging an adjustable piece secured to the duration spindle and is rotated by a racket off the worm on pallet driving spindle. The locking

index is on the outside of gyro housing thus making it accessible to look for duration. The index is graduated from 50 to 150 yards.

Broaching Spring

It is a spring attached to the rudder rod and exhaust valve casing, which causes the rudder to be in its position when air is shut off depth engine, thus causing torpedo to broach at end of run.

Rudder Connections.

The rudder rods are secured to the piston stems. At their after ends they are secured to their connections passing thru the afterbody bulkhead. This place is made tight by a stuffing box and gland. The after ends are secured to an adjustable yoke connected to a bell crank which moves the rudder up or down.

J M 11/7/19

Part II

Torpedo Overhaul

Exercise Head.

All dents must be removed from the exercise head before firing, as it has been found that an exercise head which is dented will decrease the speed of the torpedo.

Shifting the exercise head 1-26 of a turn to the right of center causes the torpedo to deflect to the right and 1-26 of a turn to the left will cause the torpedo to deflect to the left, for this reason make sure that the head ballast is in a correct place.

This head which is fitted with a buoyancy chamber is attached to the bulkhead. Great care must be taken so that the chamber does not spring a leak. If it did it would fill with water, and in filling, the exercise head and the buoyancy chamber would increase the weight of the head. If it sprung a leak after the head had been filled, it would leave the water in the exercise head. During a practice run the water would surge back and forth and cause an irregular depth performance. An experimental 18 inch B. L. Mark VII torpedo was fitted with an exercise head weighing 437 lbs. The torpedo ran very deep and sank at the end of the run.

With weight reduced to 337 lbs. the torpedo made a successful run. Never fire a torpedo unless the head is in A-1 condition, as everything counts in torpedo firing. Don't think that you should be more careful with one adjustment than you would be with another.

The same care must be taken with all adjustments. They are all important. One can't work without the other. Never fire a torpedo when in Doubt about anything; Always Be Sure; then go ahead.

Air Flask.

On receiving a new torpedo it has been the custom to overhaul it completely. The forward head of the air flask should be taken out and the flask examined to see if the interior is in good condition. It should have a good coat of varnish and be free from rust and dirt. If it is the least bit rusty, wash it with boiling lye water, using a long brush, until all the old varnish is washed off. Drain out the lye water, wash out with fresh water, and dry out with clean rags. Never use waste. Then wipe out with alcohol. It is then ready to varnish. There are two ways of varnishing, one is to put the varnish on with a camel hair brush, the other by pouring the varnish in the air flask and rotating the flask several times. Do not use

too much varnish as a large amount will run to the bottom of the flask before it has time to dry.

The varnish used is mixed in the following proportions:-

3 parts of spar varnish
1 part of boiled linseed oil

This can be done with the after head in place. When replacing the head, clean off all varnish around ground surfaces & cover same with heavy oil.

Important:- Before grinding in the heads it is very important to inspect for burrs on top holes in the flask as they will scratch the ground surfaces & cause a leak.

A slight amount of water will collect inside of the air flask after several runs this should be drained off by depressing the tail & opening drain plug otherwise a cold run may result.

Do not put heavy grease on outside of torpedo before a run. Use clean oil. Too heavy a grease will cause the torpedo to lose about one knot in speed.

Note:- The after bulkhead of this flask carries the main air connection also a pipe line to flask drain. To take this head out, the water compartment must be disassembled. First take out and plate on the water compartment bulkhead & insert tool (221). and break main air line, take off stop & charging valve, air manifold

and fuel & water checks. Take out holding bolts & take out bulkheads. The fuel pot is attached to the bulkhead & will come out with it. Disconnect flash drain pipe from after flash head & drain valve. Take out the holding screws & push head off seat. Take it out through the forward part of air flask. In replacing the heads do not set up on screws tight, at first turn on air & the heads will seat, then set up on screws.

Water Compartment.

Never put a pressure in the water compartment, unless there is a greater pressure in the air flask; as the after bulkhead will surely be blown in & badly damaged. Considerable sediment which will collect in this compartment should be examined, cleaned & given a coat of varnish made by the same formulas as that applied to the air flask. This sediment will clog water strainers causing slow & short runs, & will cause superheater pot & engine to burn up.

Faults Causing Cold and Erratic Runs.

Leaky bulkhead, loose pipe connections, decayed rubber washers on relief valve, leaky checks, pistol failing to fire, water in alcohol, failure to fill fuel & water compartments full.

Check Valves.

Upon receipt of torpedo both check valves should be removed from ~~torpedo~~ flask, cleaned & ground in if necessary.

Grounding in a check valve.

First group consists of alcohol air supply & water air supply valves, screw small screw rods into ends of valves the one marked G into alcohol & the one marked W into water check valve. With tool 12, unscrew valve seat nut, this removes valve complete, unscrew screw "a" from top of valve & remove spring, clean with gasoline & blow off with air jet. Create a vacuum with your lips, if this is not possible apply a small amount of lapping dust mixed with oil on ground surface of top valve. Be careful not to let any dust to creep up on the side of valve; grind in by hand & wash off with clean gasoline & test for tightness, repeat this until valve is tight. The top valve of the water check is ground in, in the same manner. Now try the bottom valve of alcohol valve, if not tight grind in, in the same manner. When tight wash off with clean gasoline, replace spring & oil with sperm oil & assemble. Use tool supplied when grinding in bottom valves, round off end of spring, so that it will not catch valve stems & grind them, use steel spring for water & brass for alcohol.

The second groups consist of the water supply & the alcohol supply check valves. Test the same as others, except first unscrew nut from end of water check valve,

remove spring & nut then replace nut & top valve & test for tightness if not tight grind in, the alcohol valve is ground in, in the same manner.

After return of torpedo from a run the check valves should be cleaned & washed off in fresh water & given a good coat of oil, "castor oil preferred."

If torpedo is allowed to stand for two or three days & then fired without cleaning or oiling the check valves, the chances are that the torpedo will run cold.

To seal check valves when firing submerged use celluloid discs covered with hard Albany grease.

Fuel & Water Spray Test.

By steps.

Step No. 1. Connect up fuel spray to fuel check valve water spray to water check valve upper, using spray from torpedo combustion pot put in eye rod in checks.

2. See that you have about 1000 lbs. of air in air flask & if you are going to use air from air flask put gauge in charging valve. Connect test pipe to nipple on side of stem of gauge leading it to the panel test board. Connect up pipe from reduce side of test board to air manifold.

3. Fill up fuel pot & put in fuel pot plug, then fill up water compartment. It is a very good idea instead of putting in water compartment plug, screw a small

gauge in its place. This will register the exact amount of air in compartment.

4. Have a man stand by with stop watch, open stop valve on torpedo until gauge in charging valve registers about 600 lbs. Have one man stand by control valve on panel test board. Give word "stand by" & when on Mark (call out Mark). The man on test board & control the air to fuel & water air checks. Note the pressure on gauge board & one on water compartment. They should not read more than 40 lbs. or less, on the instant the fuel starts press stop watch stem once. Note when fuel comes. The fuel should start before the water. The fuel should last about 4 minutes & 40 sec. & the water should last 15 seconds longer.

Note: Fuel should always come first. If the water came first it would put out the fire & cause a cold run. The spring in the fuel check valves are weaker than those in the water checks. In assembling never get the springs mixed. If the fuel runs out too soon you will know that the spray holes are too large, in this case you will have to use a new spray or make the holes in the old sprays smaller. This can be done by drilling out a hole & plugging it again & redrilling. If the fuel is too slow, it shows that the holes are too small or pipe lines bent, holes in pipe lines being forced together by tightening too much or dirty strainers. Great care must be taken with the pipes in connecting up fuel lines, they should always be blown

through before connecting up. Never tighten up too tight on nuts. This spreads the shoulder & prevents nut from turning & also closes the opening. If you have to bend a pipe in place, never try to bend the pipe if it is hard. It will probably break or bend in such a way as to close the interior passage. All pipes should be annealed very often. To do this heat up the pipe with a torch to a cherry red, then dip in water. This will soften the pipe & you will be able to bend it in any shape desired. After this has been done the pipe should be cleaned out by blowing through. The heating process formed a crust in the pipe & if left in there would be blown through & plug up strainers & spray, causing a cold run.

Take same precaution with water spray & pipes.

The Main Engine.

Jan 18/19

Assembly and disassembly:-

To disassemble put engine in a stand or wooden block hollowed out to receive engine shaft. The blocks are held in a vice & the engine shaft clamped as close as possible to the engine, the oil pump on top.

Take out split pins & remove nuts on studs holding turbine bulkhead. Disconnect pipes from turbine bulkheads and remove same. Take out oil pump holding

bolts & screws, lift off pump. Remove pipe manifold from engine frame. Put pipe or wrench through holes in main driving gears to clamp same. Take off work nut on turbine spindle & lift off ball race & remove balls. Slack up holding screws. Take split pins out of ball race keeper, slack up holding bolt & remove ball race. Drive wedge in spindle casing if necessary. Take out balls, also the ring & turbine pinion. Remove turbine & its spindle. Now turn the engine right side up. Take out lock nut keeper screws & pins & unscrew lock nut & lift off turbine wheel. Remove split pins & holding bolt of spindle casing, wedge if necessary & remove upper ball race with balls. Remove pinion sleeve. Take out holding screw in top frame, take out screws in casing. Remove engine frame strut allowing frames to come apart. Slide out inner shaft with cross head taking care not to drop balls into the thrust bearing. Remove packing screw in end of shaft.

Nozzle and Turbine Clearances.

With engine bulkhead off take 1" micrometers & take the thickness of the bulkhead. Then take the height of nozzle with depth micrometers & the thickness of the gasket. Subtract the thickness of the gasket from the height

of nozzle, & compare the remainder with the thickness of bulkhead. It should be as nearly flush as possible. If the nozzle extends .001 or .002 though the bulkhead, add the .050 to it & that will give you the reading you should get with the depth micrometers from the face of bulkhead to first turbine.

Example

The Nozzle	.402
The Gasket	.025
	.377 nozzle
The Bulkhead	.375
	.002

This shows that the nozzle is extending .002 though bulkhead, so add the .050 to the .377 - nozzle - & that will be the reading you should get .377 + .050 nozzle clearance = .427

Rotate turbine wheel & take reading all around. It sometimes happens that the turbine is warped or the spindle bent & may probably give a reading of .427 in one place & .450 in another, in a case like that you would have to get a new turbine wheel. If the clearance varies from .001 to .007, it is considered all right, over that amount it should be remedied.

This clearance is taken with the engine upside down. If the reading was .432 that would show that the turbine was too far away from nozzle. To bring it up you would come up on your middle bearing one notch, & set up on your upper bearing one notch. Each notch moves bearing .006" so in moving bearing in one notch it brings turbine closer to nozzle by .006, making the reading .426. After you move the bearing check up your reading. If it reads the right amount,

clamp your upper bearing & lock it. Then set up your middle band, taut & back three notches, this gives you the .018 bearing play. When you turn up your engine the turbine instead of being .050 clear, will only be .032, but when the air hits it from nozzle it forces it up to the proper amount .050.

Nozzle clearances are taken with No. 2 turbine off.

To get nozzle clearance, assemble first turbine & put on bulkhead, take depth micrometers & place them flat on bulkhead in reserve for nozzle, & work stem until the points touch the rotor & first turbine. Then note the reading.

After you have taken your reading & set the first turbine remove engine bulkhead & assemble the second turbine. Then take thickness guage or feelers & set for .050, place .050 feeler between first & second turbine & ~~remove~~ move it all around. If it moves too freely without the least resistance, turn to the left on lower bearing. This will bring the second turbine closer to the first. Turning to the right will give you more clearance. After you get proper clearance lock bearing & clamp. See that split pins are in place & assemble oil pumps & connect pipe lines to bulkhead. Place engine in afterbody. After the engine is in place in afterbody take another reading on your nozzle clearance. It is always best to be sure that you have the proper clearance, if the clearance is too small the turbines are liable to

touch + turn up, if the clearance is too great it will cause loss of speed.

Overhaul And Disassemble Of Oil Pumps.

The oil pump body is secured to the lower engine frame, & to the lower bolt of the cross-head. The principal parts of the oil pump are the worm wheel, connecting rods, the plungers, the liners, the valve plugs, & the ball valves. The pump has three parallel cylinders + plungers which are reciprocated by eccentrics on a vertical worm wheel. This is driven by a worm machined lock nut at the lower end of the turbine spindle. The plungers work in liners, so fitted to body as to be easily removed for inspection, or renewed. Each liner has a flange on it's forward end fitted by two holdings screws to which the liners is secured, the valves of the oil pump consists of steel balls, + are held on their seats by gravity suction valves + seats are accessible by removing valve plugs. To test out oil pump, get a small can of oil, put supply pipe in can + turn vertical worm wheel, watching oil on discharge end. This pump supplies oil for the turbine spindle, crosshead, + main driving gears.

Centering Depth Mechanism.

Pendulum's adjustment. With afterbody in stand + leveled (main engine + gyro housing removed) see that pendulum moves freely + hangs vertical; verify position of the centering plate, so that with the transportation screw inserted, the pendulum will be

centered. Make sure that pendulum & checking valve connecting rod are straight. Adjust pendulum checking springs so that the pendulum will start to move at an angle of ½ a degree either way. Put sufficient tension on valve connecting rod buffer spring, as that rod will work properly yet absorb a shock to steering lines. About 5 turns on spring buttons will suffice.

Immersion Chamber

Test immersion chamber for leaks; one method is to connect test pump to relieve valve body, putting on about five pounds pressure & running over the joints etc., with sperm oil, also it may be immersed in water.

Depth Engine

This engine should be washed in gasoline to remove all dirt or foreign matter. Examine piston rings for burs or scratchers. Use sperm or other light oil & assemble. Test for leaks around packing nut on cylinder head by connecting up an air lead using about four hundred & fifty pounds pressure. Center piston in cylinder. By turning air on & moving control valve all the way in; this will bring the piston to the after end. Measure the distance the piston stem projects beyond the cylinder head turn off air. Pull piston up against cylinder head by hand & measure again. The difference between the two measurements is the clearance at this end. If the clearance is not the same, equalize them by shifting the index pointer towards the end with the larger clearance. Test control valve

for sensativeness by turning on air (450 lbs.) & move valve stem with testing tool (222). It should move from 1/2 to 3/4 ounce on spring gauge.

Valve Connections.

Center hydro piston by inserting clip (214) under diaphragm yoke at stop & putting slight tension on depth springs. Connect valve link to valve stem square up valve lever so that it will be perpendicular to gyro housing with this done the pointer will be opposite the center graduation on the valve stem. If not so, slack up clamp screw at scarf & turn knurl nut at valve stem, until it is in proper position, then set up on clamp screw (if necessary) while index pointer is opposite center graduation engage locking fork, slacking up on clamp screw if necessary, then tightening up same. This adjustment is permanent unless it should be necessary to lock rudder for a position other than one division down.

J.M. 1/15/19

Calibrate Depth Springs

When ready to install gyro housing in afterbody, put sufficient tension on depth springs (usually seven & a half turns on adjustment screws will suffice) so that a pressure inserted by spring balance (tool No. 86) when diaphragm yoke close to stop will put hydro piston in mid position. Precaution should be taken that the depth registers ten feet before meshing spindles. After installing housing index is turned back

to zero on fast as necessary. With the locking fork engaged & the transportation screw in, connect up the pendulum connecting rod up with valve lever. It may be adjusted for length by slacking up on the clamp screw & turn rod in it's sleeve. Connect rudder rod to depth engine piston & work rudders to determine strength of broaching spring.

Rudder Throws — The rudder throws due to hydro piston is 3/4 up & 2 3/4 down with the line centered up the rudder should read one down. If they do not the change is made at the adjustable turn buckle at the tail, the rudder rod being lengthened or shortened.

Hydro Throw — To take hydro throw, see that transportation screw is inserted put slight tension on depth spring, see locking fork disengaged putting distance gear off zero throw back starting lever, open stop valve until sufficient air is turned on, push upon piston for up throw, release - spring pressure will give down throw.

Pendulum Throw — To take pendulum throw the transportation screw is removed. The hydro piston put in mid position (by means of clip under slight spring tension) turn air on in the same manner as for hydro throw. In line torpedo up & down. Rudders should be 1 1/2 up & 4 down as per record book.

Use of adapter — To take rudder throws while main engine is removed from afterbody; adapter (Fig 223) is inserted in strainer body the strainer being removed. This adapter blanks off the supply lead to strainer & also serves to economize on the

air. Drain lead from panel board or testing gauge fitting, and
discharging valve being lead to nipple on adapter.

Afterbody — Overhaul the afterbody all movable contents should be taken out, i.e., gyro housing, starting & distance mechanism, main engine exhaust valve casing, rudder rods, pendulum & all pipes, clean everything thoroughly with gasoline.

Examine all gaskets & washers, i.e., felt washer in tail or afterbody, gyro. housing, starting gear, exhaust valve, casing & turbine, also see that drain & filling plugs are supplied with copper washers & renew if necessary.

Examine exhaust valve seats, grinding in if necessary, using white metal polish unless seats are in bad condition when fine powdered pummy stone or carborundum should be used, & always finish up the seat with a fine light oil, preferable, sperm oil.

Examine pendulum hanger brackets & transportation screw body.

Examine turbine bulkhead & handhole studs, making sure they are sweated in properly & that threads are in good condition.

Clean all oil cups, leads, etc., & also make sure cooler is in proper place.

The Valve Group — Dis assemble & clean valve group, wash with gasoline if possible. Examine valve seats for burrs or scorings. Examine & grind in stop & charging valves using white metal polish, unless seats are in bad shape in which case fine pumice stone or carborundum should be used. always finish up with a light oil (sperm.)

Connect up to air supply (225o); & test out stop & charging check valves for leaks.

Combustion Flask — The combustion flask should be dissembled, all rust, etc., being removed from interior. To break down remove compression screws & screw off the top.

Examine nozzle for roughness or restriction, remove same.

Starting and Distance Gear — To overhaul, disassemble parts, wash in gasoline, oil with sperm oil & assemble. Grind in starting piston & connect supply lead to air supply (225o), & test for leaks.

The Tail.

To overhaul the tail, remove the contents, & clean out thoroughly with gasoline; removing all corrosion, etc. Square up tail blades. See that oil holes, leads & channels are clear.

See that rudders line up properly, also rudder rods etc., work properly.

Examine oil check valve, renewing ball check if necessary.

Break down propeller sleeves cleaning out interior

Put propeller blades on block.

Before assembling, coat inside of tail with a thin coat of red lead or vermilion, to preserve metal from rust.

Precautions in assembling.

After assembling tail see that there is about 1/8 inch clearance between

propellers. This is determined by the tail tailrace, which should be stoned down if necessary.

Also make sure that oil leads is connected when attaching tail to after body.

Erratic Runs

Probable Causes for Same.

Cold shots.
Defective Pistol or fuse.
Water in superheater pot.
Leaky check valves.
Leak in fuel flask.
Leak by starting valve.
Fuel pot not completely filled.
Leak by reducing body plug.
Air leak in guide tube.
Air leak from air flask into water compartment
Restricted air supply to fuel flask.
Leak by starting piston.

Slow runs not due to Cold Shots.

Improper speed ring. Insufficient clearance in tail bearing, to allow for expansion of propeller sleeves. Too much shoulder exterior of torpedo. Rusty or imperfect balls or races. Too great a clearance between nozzle & first turbine, thus losing the efficiency of the air. This applies also to the turbine clearance.

Poor lubrication. Too small a clearance between vane, this would cause the turbines to rub on each other or the first turbine to rub on flash pan or engine frame. Turbine spindle bushing improperly installed.

Failures in depth- Shallow Runs.

Leak in after cylinder head of steering engine. (depth
Improper calibrated depth springs. Failure to set depth index.
Diaphragm yoke jammed in up position. Rudders improperly adjusted.
Leak through after packing of steering engine.

Deep Runs.

Air lead into immersion chamber. Diaphragm torn.
Improper calibrated depth springs. Rudder throws improperly adjusted.
Rudders not parallel to each other.
Leak by forward packing of depth engine piston.
Control valve too loose a fit allowing escape of air from forward end.
Depth engine stiff or sluggish.

Failures in Deflection.

Gyro spinning gears forced together when not properly meshed, result centering pin jammed or bent. Gyro control valve stuck.

Rudders jammed, or improperly adjusted. Leaky gyro engine.
Gyro failing to be released. Oil or water on gimble rings, or faulty bearings.
Pallet mechanism not properly adjusted.

Causes for Sinking.

Torn diaphram. Leaky exhaust valves. Failure of starting mechanism.
Distance gear cutting off, torpedo having negative buoyancy.
Governor mechanism functioning, torpedo having negative buoyancy.
Torpedo having too heavy an exercise head.

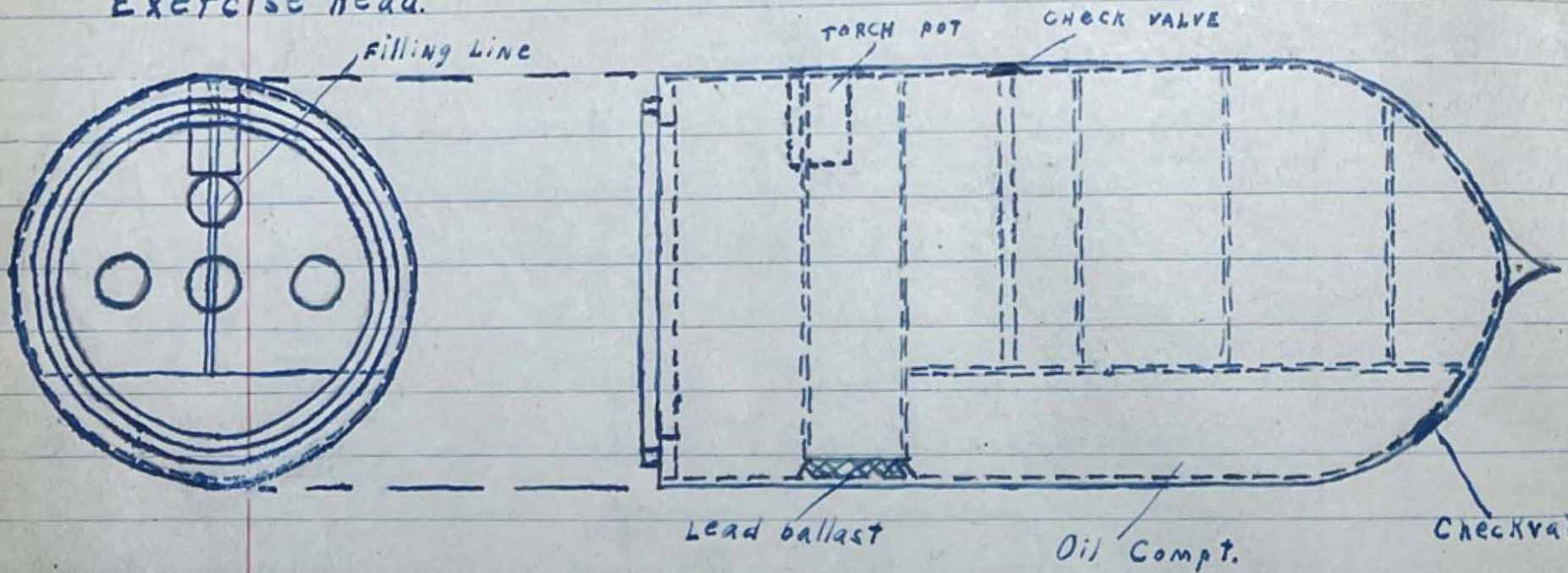
Torpedo adjustment card- exercise run.

1. See torch in and punctured.
2. Remove fuel pot plug.
3. Distance gear on zero.
4. Charge torpedo.
5. Oil regular valves, (sperm oil) engine oil cup and tail bearings, (rams oil.)
6. See speed ring in and set up, see pistol and burst fuse in.

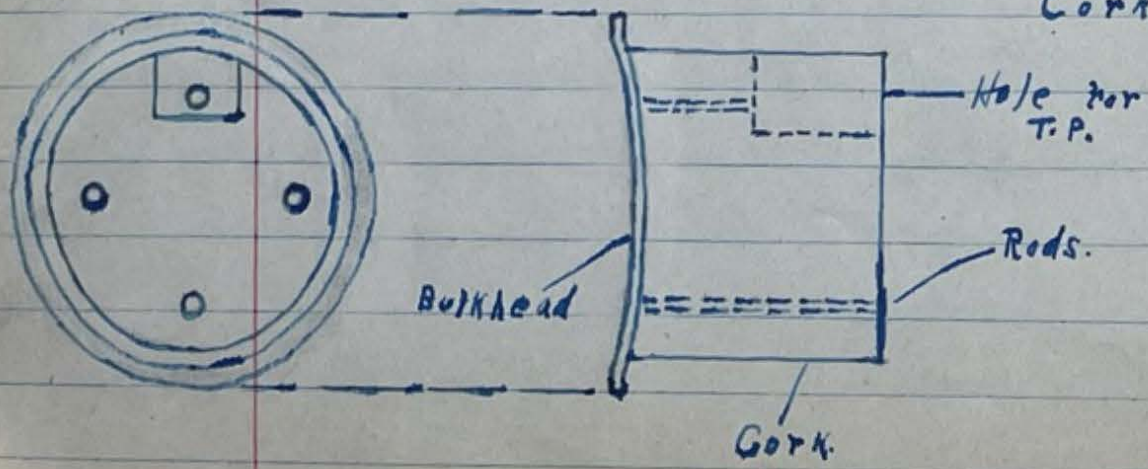
7. Set distance gear for short run, see propeller lock On.
8. Throw back starting lever.
9. Crack stop valve.
10. Test rudder throws.
11. Lock for short duration.
12. Adjust locking fork for position.
13. Remove propeller lock & run engine till locking gear & distance gear function.
14. Oil reducer, engine oil pot and tail bearings.
15. Open stop valve one half turn.
16. Remove pistol plug and pistol.
17. Turn torpedo 180 degrees.
18. Inspect gyro pot, see curve fine plate on zero.
19. Install gyro, lock, release and lock.
20. Lock for duration.
21. Put few drops of sperm oil in air strainer, inspect fuel strainer
22. See drain plugs and replacement screw in.
23. Relieve pressure in immersion chamber.
24. Inspect fuel and air checks and oil same.

25. Turn torpedo 180° upright.
26. Put hand hole plates on.
27. Fill fuel pot, unseat check valve to advance fuel, refill fuel pot, see plug in.
28. Fill water compartment and see relief valve in.
29. Roll torpedo 90° left to drain combustion pot.
30 Set distance gear.
31. Set depth index.
32. Pack tail with heavy grease.
33. Inspect sinking attachment.
34. Seal check valves with soap, and air checks with dorco.
35. Open stop valve wide.
36. Install pistol and fuse, and put in pistol plug.
37. Verify adjustments, and see firing lanyard in place.
38. Shove in tube, seeing tripping latch up and stop bolt down.
39. Secure firing lanyard to tube door.
40. Remove propeller lock, close door.

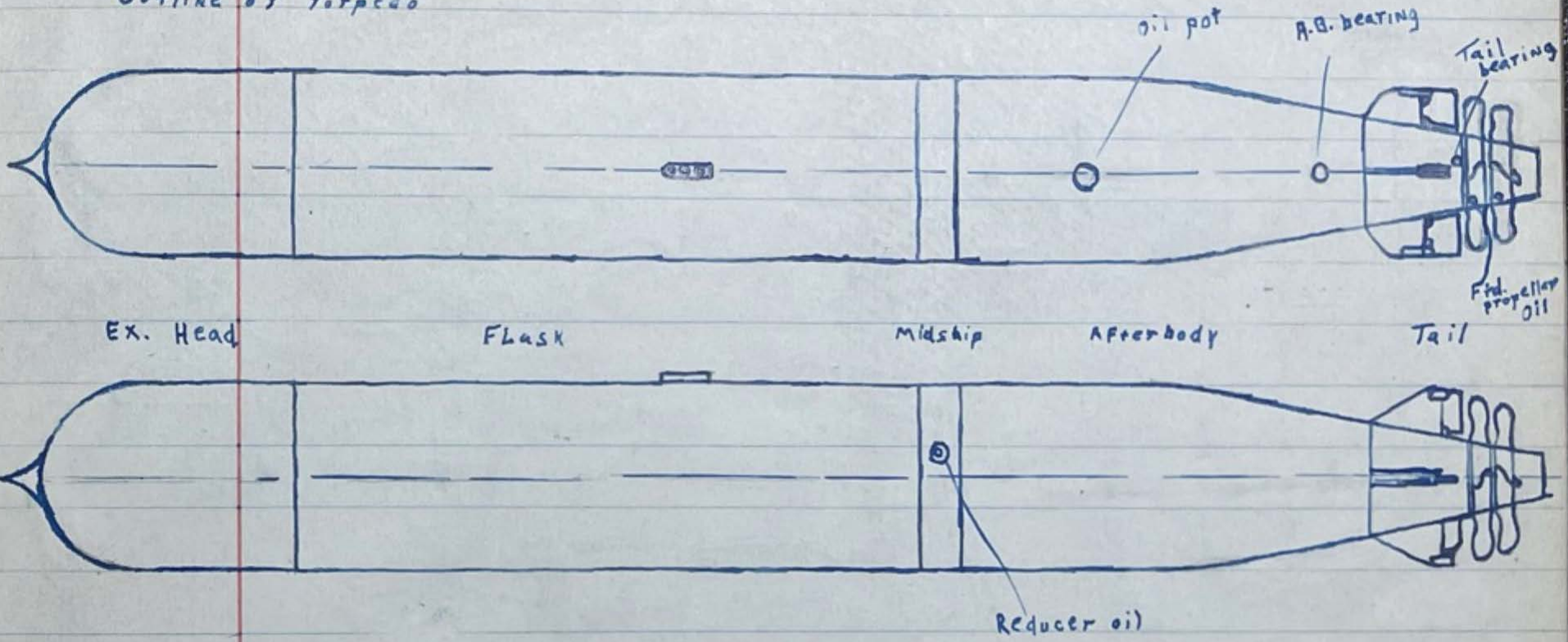
Exercise Head.



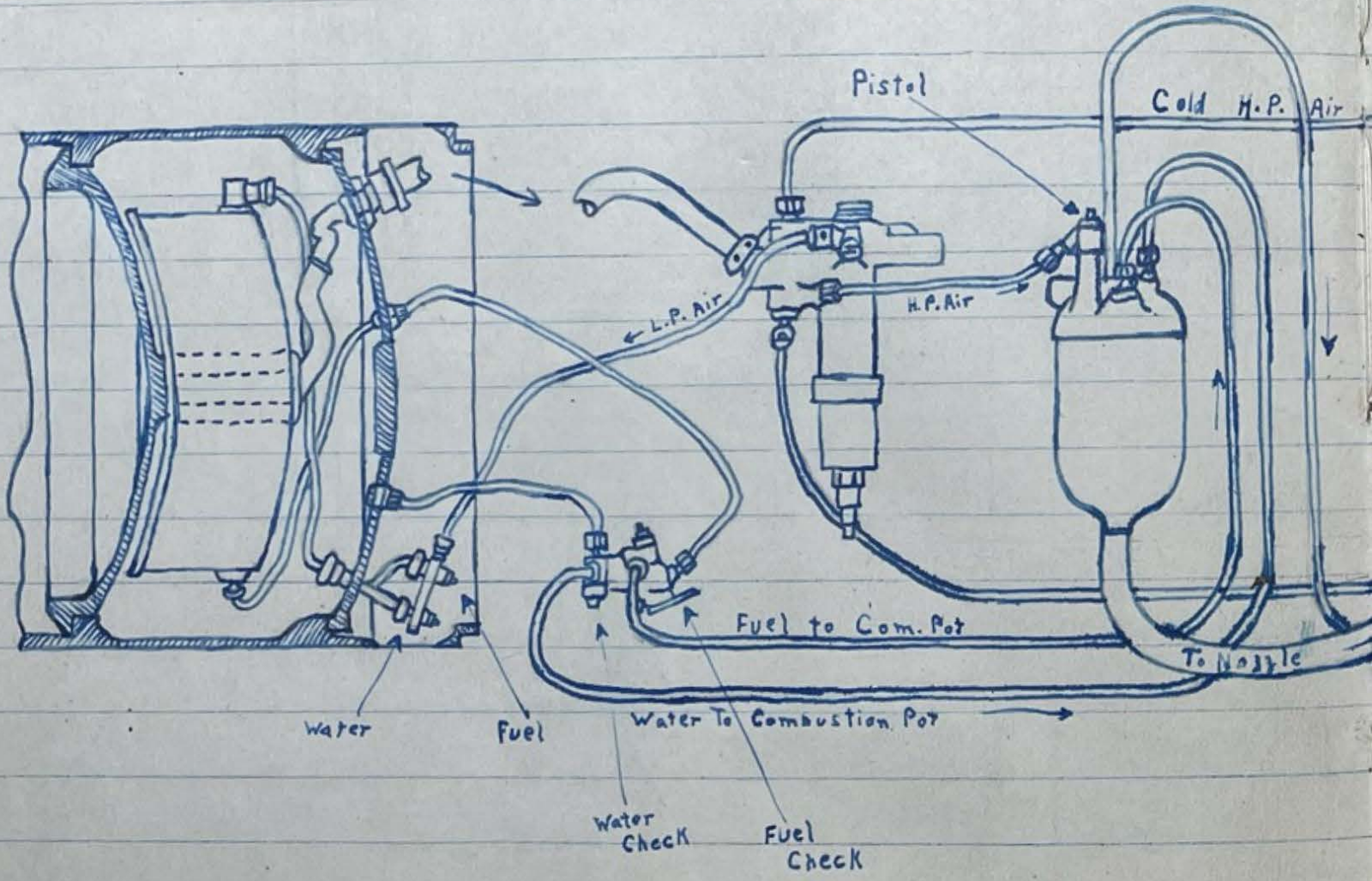
Cork Dummy

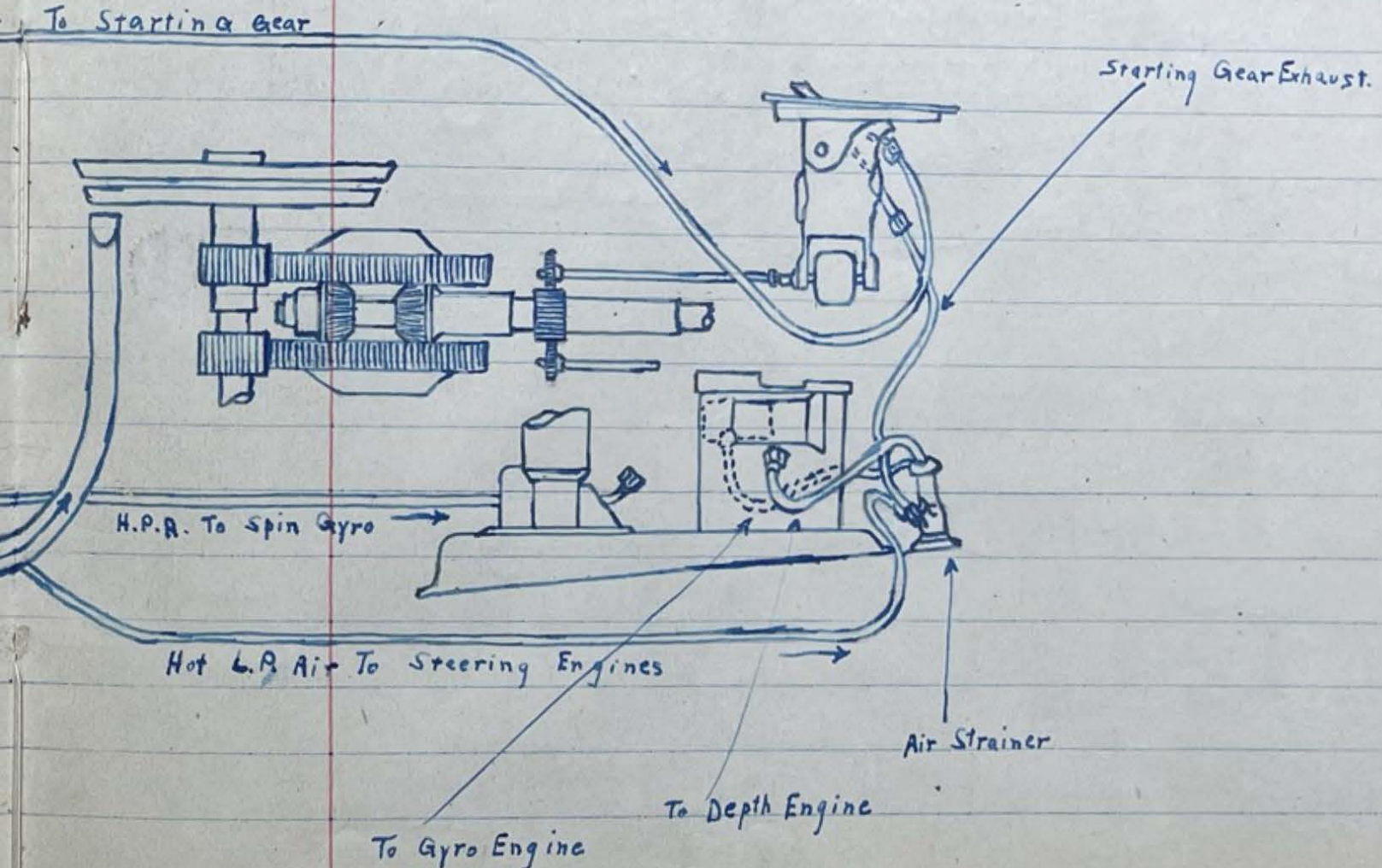


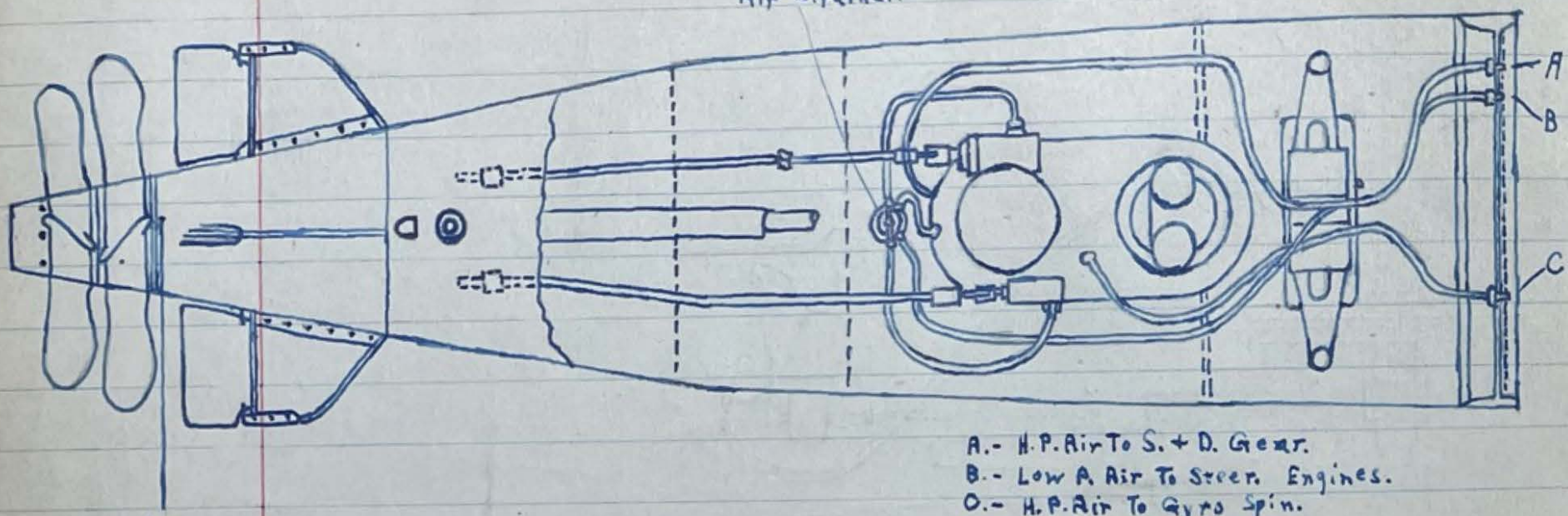
Outline of torpedo



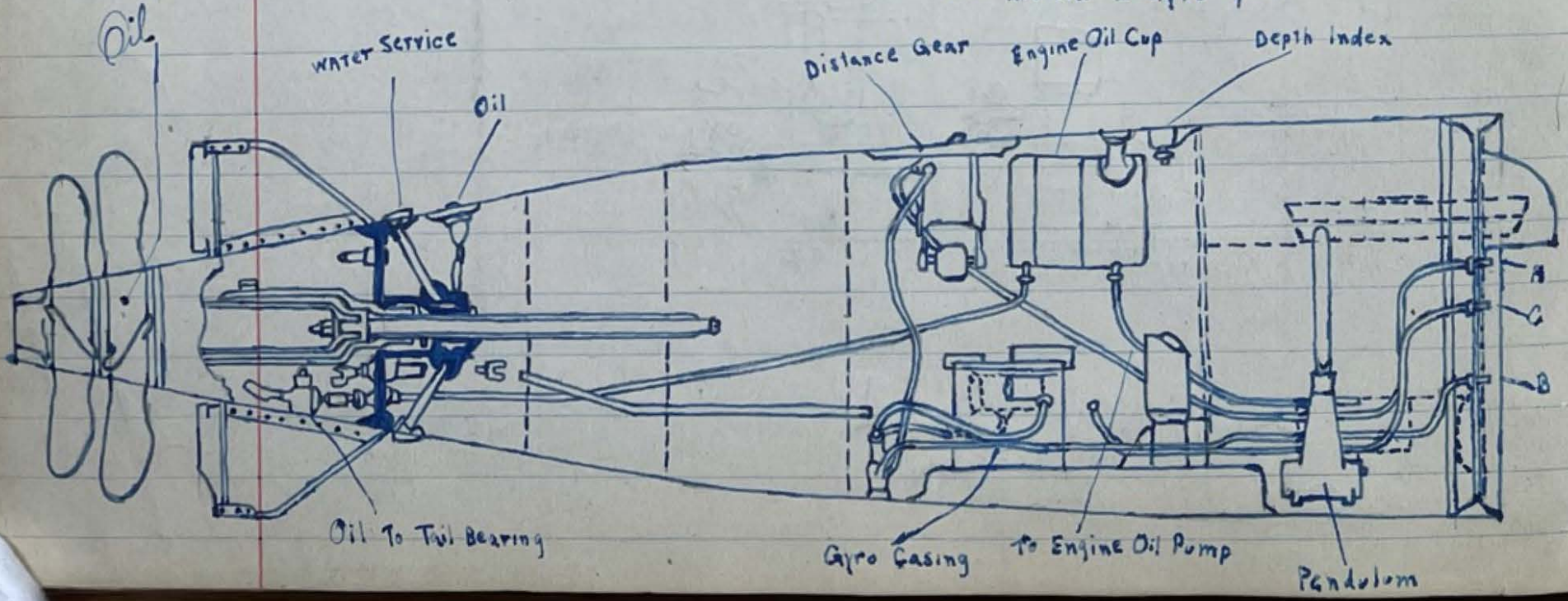
Power Control




To Starting Gear
Starting Gear Exhaust.
H.P.A. To Spin Gyro
Hot L.P. Air To Steering Engines
Air Strainer
To Depth Engine
To Gyro Engine



A.- H.P. Air To S. + D. Gear.
B.- Low A. Air To Steer. Engines.
C.- H.P. Air To Gyro Spin.



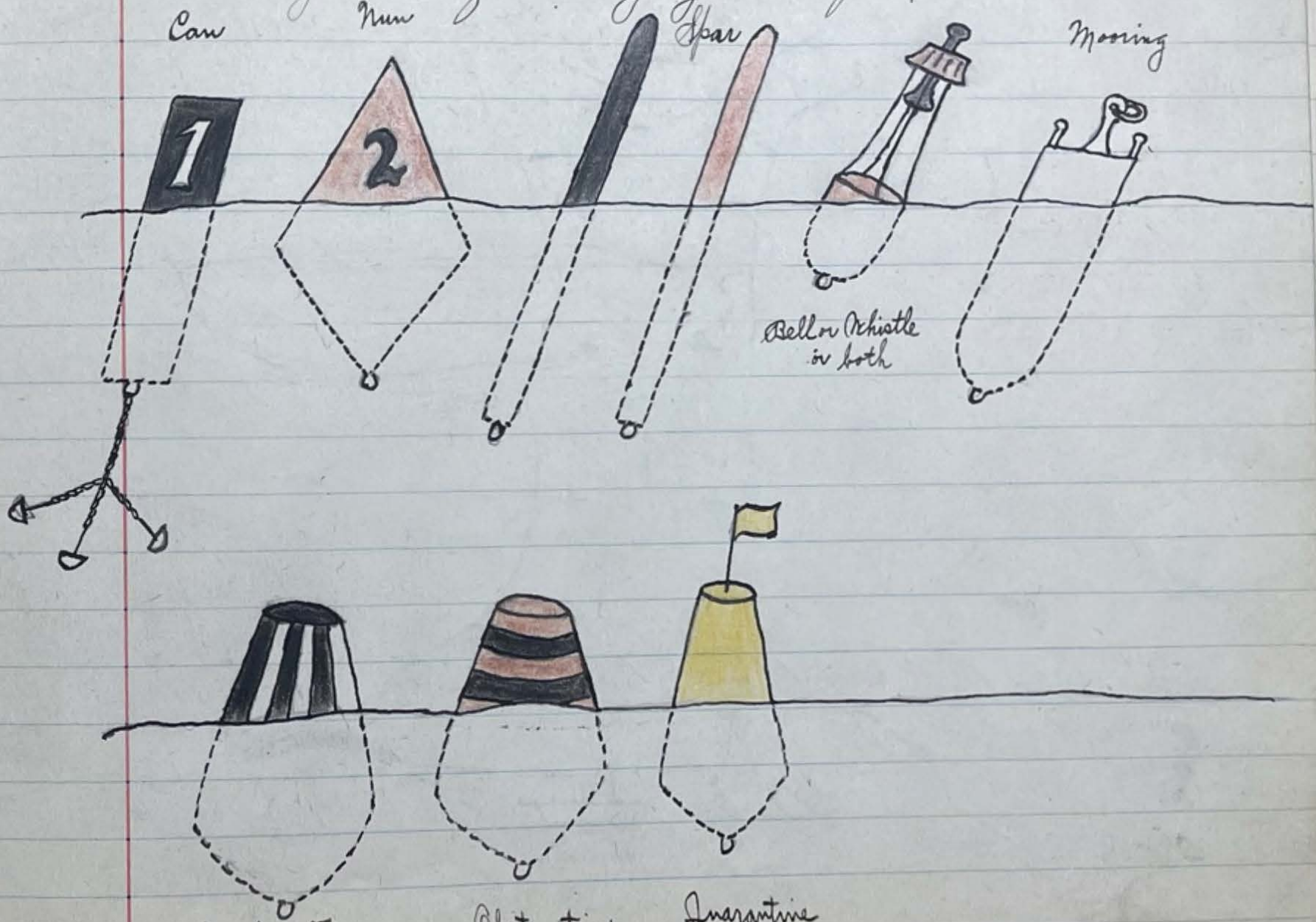
Name	Rate	Address	Town
Alfred A. Wollstein	Sea 2nd	511 W 147 St.	New York
James Robert Howell	Sea 2	3101 Powelton Ave.	Phila.
William J. Ewald.	Seaman.	3941 Lake St.	Chicago.
George B. Best	Sea 2	34 Church St.,	Englewood
Earl O. Baird	Sea 2 (Pelham N/C)	116 Lakewood Ave;	Freehold
Augustine J Cunningham	Sea 2nd	Winden Ave	Stratford
Chester J. Small	Sea	cor. Juniper & Washington	Marietta
Stephen Wm Beckman	Sea 2	252 Westminster Rd.	Brooklyn, N.Y.
Edward James Kearney	Sea	217 High St.	Glenenville, Ky.
Leon J. Kelly	Sea	602 Lexington St Boston	
Gilbert A. Yoder	Musc	35 No Edgewood St.	Phila.
Frank L. Hicks	Sea	339 St. Ann's Ave.	N.Y. City
Joe G. Lane.	Sea.	212 Archway	Austin
J. Lester Potts	Sea	284 Magnolia St.	Jersey City
H Noland Hess	Sea	Box 270 Murphy	N.C.
Earl L. Annear	Sea	102 Union St.	Rockville
Albert Jos. Stallmer	Sea.	2333 Catalpa Ave	Glendale Ky
R J Mattson	S. St.		N. Carolina
Emil L. Roemmele	Sea.	52 Lawrence St.	New York City

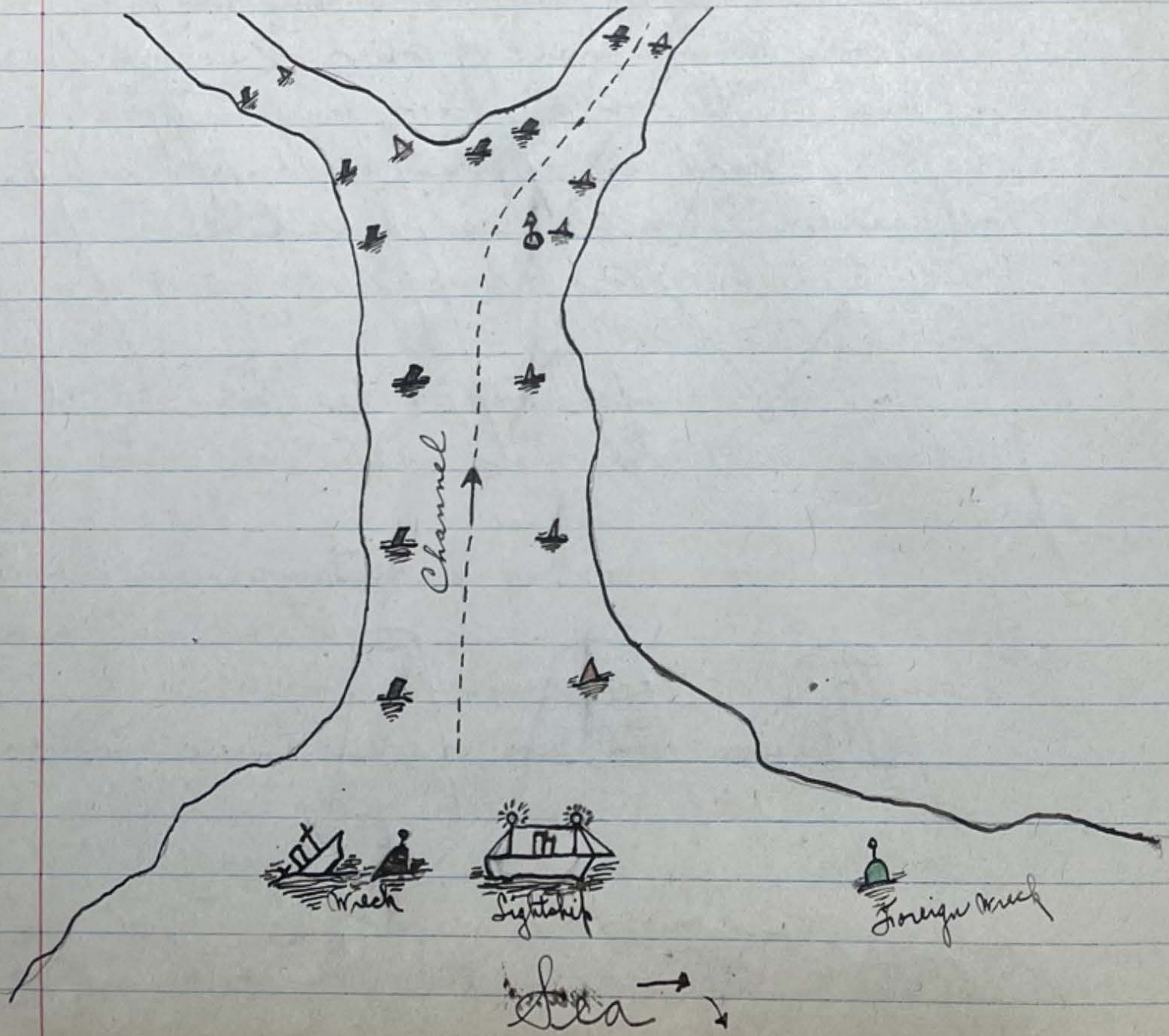
State	Ship or Station	Occupation
New York	Submarine Base	Asst Eqpt Manager
Penna	"S.S. Sherman"	philantrophist
Illinois	Submarine Base.	R.R. Conductor
New Jersey	" "	School??
N.J.	Sub Base	"Stwudent"
Ohio	Sub Base.	Accountant.
California	Sub Base.	Clerk.
New York	Sub. Base.	Student
New York	Sub. Base.	Student.
Mass	Sub. Base	Machinist
Penna	Sub Base	Motor construction
N.Y.	Sub Base	Salesman
Texas	U.S.S. San Diego	— K Ranch-
N.J.	Sub. Base	Engineer
	" "	Stock Farmer
Conn	Sub. Base	Linotype Operator
Ny	U.S.S. Ulysses	Civilian preferred.
Mass	Sub Base	Submariner
N.Y.	Sub Base	Clerk

Name	Rate	Address	Town
Kenneth G. Henke	F.M. 3	8 Montclair Ave.,	Montclair
George T. Sloeum	Sea.	65H Mervis Street	Revere
V. E. Reese	F.M. 3.	144 Water St	Perth Amboy N.J.
William E. Dickens	F.M. 2	3616 Cedar Ave.	Baltimore
Lee L. Laycock	Sea	356 Fifth St.	Baton Rouge,
Hopkins Follett	F.M. 2/c	1870 Beacon St	Brookline
Thomas F. Lynn	Sea 2/c	85 Jackson St	Holyoke
James V. Wood	Sea.	637 Dewitt St.	Syracuse
Robert J. Wallace	F.M. 2/c	49 Glenwood Pl.,	Summit
Robert A. Grant	Sea.	Smigdon Road	Bridgewater
Chester Foran	Sea. 2.	13th St	Woburn
Lt. Wm. Merrill	Sea	6017 E. 11th St	Kansas City

State	Ship or Station	Occupation
N. J.	U. S. S. Mohican	Farmer
Colorado.	U. S. Sub Base.	Gold Miner.
N. J.	U. S. S. Adams.	Student.
Md.	U. S. S. Massachusetts	Optician
La.	U. S. S. C. 115	College.
Mass	U. S. S. Marold	Draftsman
"	US sub Base	Electrician
N. Y.	Sub. Base	Gear Cutter
N. J.	U. S. S. Hopkins till	N. Y. Curb
Maine	U. S. Gravelyard (Machinist)	Third Class Fireman
Wis	Naval Operating Base, Va	Farmer
Mo.	U. S. S. Goat Island	Electrician

System of Buoyage adapted in U.S. Waters.




Channel
Wreck
Lightship
Foreign wreck
Sea

In approaching a channel from sea, red Nun buoys with even numbers will be found on starboard side of channel, and must be left on starboard hand in entering.

Black Can buoys are on the port side of the channel and must be left on port hand in entering.

Spar buoys replace either port or starboard when found defective or lost.

Buoys marking obstruction are painted with red and black horizontal stripes and may be left on either hand.

Buoys marking midchannel are painted with white and black perpendicular stripes, and must be passed close to, that danger may be avoided.

Buoys with perches, balls, cages, etc. mark turning points the color and number indicating the hand they are to be left on.

When buoys are lighted those with red lights are to be left on the starboard hand and those with white lights on the port hand in entering.

Day beacons, stakes, and spindles when placed on sides of channels, are colored like buoys, and when lighted at night they are to be left the same as lighted buoys.

Bell and whistling buoys are usually placed to mark certain points, and their use is explained in the buoy book for the district.

Yellow buoys are sometimes employed by the quarantine authorities to mark a station.

White Buoys mark place of anchorage and mooring.

The Magnetic Poles.

The geographical poles of the earth are the extremities of the imaginary passing through its centre of gravity and about which it revolves, and are therefore symetrically located with regard to the equator. The magnetic poles however, are not coincident with the geographical poles nor are they diametrically opposite to each other.

Prior to the recent attempt of Amundsen to determine the magnetic pole, the only other was by Captain James Ross in June, 1831, who found the dip of the magnetic needle, 80° 59' 5" latitude; 70° 5' 2" North longtitude; 96° 45' 8" West, which is in Northern Canada in King William land.

The position of the south magnetic pole has been located in latitude 72° 23" South, and longtitude 154° East, by Prof. Edward Davis and Mr. Douglas Mawson, members of the Lieut. Shackalton's Expedition to the South Pole

which left New Zealand on Jan. 1st, 1908.

By reason of the annual variation of the magnetic needle, it is believed that the magnetic poles are not stationary, but have a slow motion around the geographical pole. The subject is shrouded in mystery and constitutes one of the many as yet unsolved problems.

The compass is an instrument for determining directions, usually by the pointing of a magnetic needle free to turn in a horizontal plane and carrying a marked card.

The Gyro Compass.

The master gyroscopic compass is installed in the central station and thus protected from gun fire. The compass depends for its accuracy on a spinning gyroscope similar in principle to a gyroscopic top; it is operated and kept spinning by an electric motor. Due to the action of gyroscope, this compass, when properly adjusted, points always to the true North. At various parts of the ship, repeating compasses, electrically controlled,

record the reading of the master compass. The gyro compass, inasmuch as it has eliminated the compass error, is of inestimable value; but the magnetic compass will always be carried to furnish a check on the gyro compass.

Steering

Ships can usually be steered from four or five places, so if one is shot away, there are other wheels available. In action the ability of the ship to steer is of prime importance. Warships are usually capable of being steered by steam from the conning platform, the conning tower, central station, steering engine room and steering gear room; by hand (without the use of the steering engine) from the steering gear room. In all our men-of-war the head of the ship goes with the wheel.

In steering the stern of the vessel is first to move when the course is suddenly changed. When the rudder is put over, the water acts on its surface putting the stem around. Ships have rudder indicators which show the position of the rudder at all times. Rudder is amidships when rudder indicator is at zero.

International Code Flags.

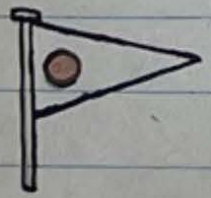
ABLE

Able: When flown above B. and N. means, "turn in sick and absentee reports.

BOY

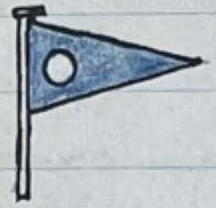
Boy: Is Powder and firing Flag.

1. Displayed at fore by all vessels taking on board or discharging explosives, loaded projectiles, fuel oil or gasoline in large quantity; (2) in the tows of all boats or lighters transporting same; (3.) it is displayed by ships engaged in target practice while firing is in progress; (4.) it is hauled half way down when off the firing line if the practice is to continue, and is hauled down at "cease firing"; (5) it may also be used at sea, in formation when standardizing propellers, to indicate that the ship is on her course and observations are in progress.

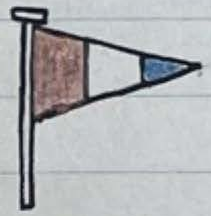


CAST

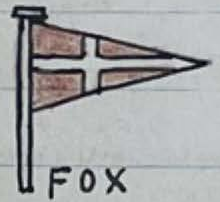
Cast: With "Nan" above is a signal of distress.



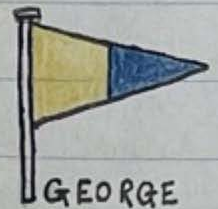
Dog.



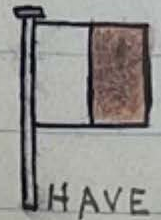
Easy: 1. On funnel means engineering efficiency.
2. Flown on main starboard yardarm when senior officer leaves ship on unofficial business for less than 24 hours.
3. When senior officer leaves on official business less 24 hrs.



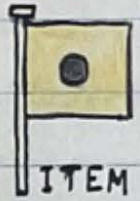
Fox.



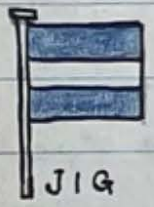
George.



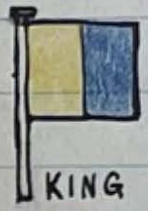
Have.



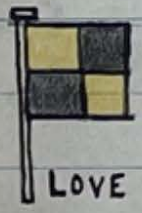
Item: 1.- Flown at main when ship is on dispatch duty.
2.- Flown at fore means "engine breakdown."
3.- For man overboard it is broken and lowered part way down.



Jig: Used between U. S. and Great Britain meaning, "Stand by for semiphore message."

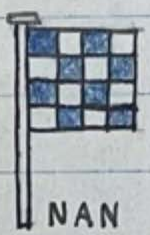


King: Negative Flag.
1.- Answer to signal means "No."
2.- Hoisted over signal puts message in negative sense.
King Numerals Quach } No bottom at 1 ft.

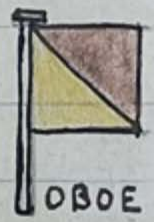


Love: Preparatory Flag.
1.- Prepare to execute signal shown.
2.- Hoisted at 6.55 by flagship or senior ship and hauled down at 7 A.M. Is time signal and means uniform is same as yesterday.
3. Hoisted at 7.45 A.M. over a numeral indicates the size of ensign to be hoisted at colors.
Hoisted at yardarm morning + evening at first call of colors + brought down at 1st note of bugle or drum.

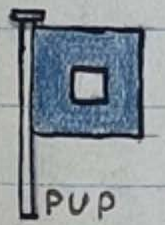
Mike: Medical Flag.
Flown at main fore yardarm means ship has medical guard of day.



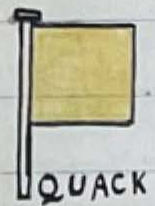
Nan: Annuling Flag.
1. Annuls all signals at that moment displayed on same hoist. 2. Hoisted alone, it annuls the last signal made on the last hoist. 3. Flown over Cast is a signal of distress.



Oboe: Interrogatory Flag.
1. Hoisted alone means, "I do not understand."
2. Hoisted over a signal changes it into interrogatory form.



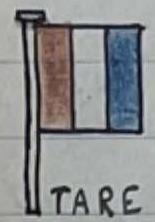
Pup: Affirmative Flag.
1. Answer to signal means, "Yes, permission is granted.
2. Hoisted over signal means that that has been performed.
3. Half way up foremast - anchor at short stay. All the way up foremast - anchor aweigh. Hauled down when ready to take position.
4. When ready to steam ahead after "man overboard."
5. Duty called for by previous signal has been completed.
6. P. over T. is signal for Pilot.



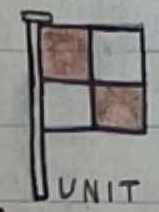
Quack: Quarantine Flag. No. 1.
1. Hoisted at foremast means quarantine
2. Hoisted by incoming ship means pratique is desired.

Rot: No. 2.

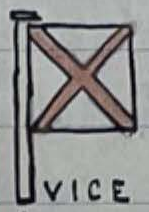
Sail: No. 3.
1. Flown at fore is signal for Pilot
2. Part way down - Pilot aboard.



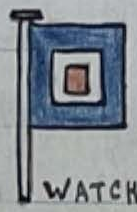
Tare - No. 4.
P. over T. is signal for Pilot.



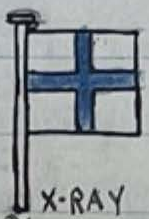
Unit: No. 5



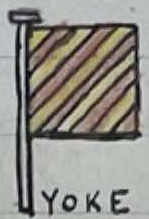
Vice: No 6.



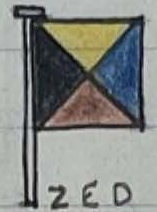
Watch: No. 7



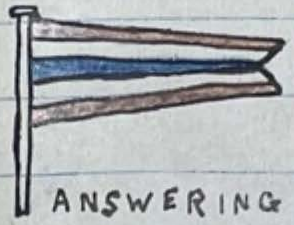
X-ray: No. 8.



Yoke: No. 9

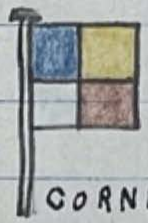


Zed: No. 0


ANSWERING

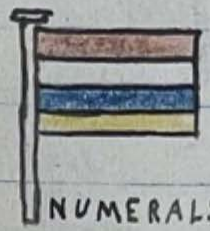
Answering and Divisional Penant.

1. Hoisted where best seen when answering.
2. Used as a divisional point.


CORNET

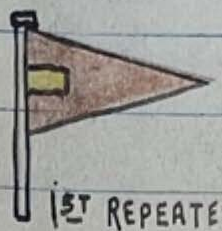
Cornet Flag

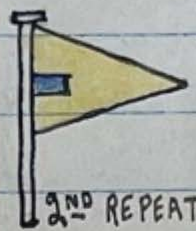
1. Hoisted at fore, or highest gaff or signal yard is order for everybody to return aboard ship at once
2. Means ship is under sailing orders and about to get underway
3. Hoisted half-yardarm light is call for whole force to receive semiphore or wigwag message.


NUMERALS

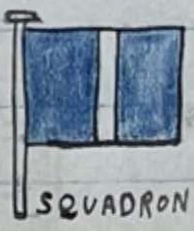
Numerals Flag

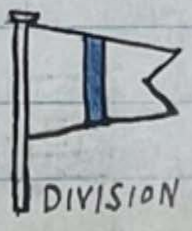
1. Hoisted over certain flags indicates that those flags are to be interpreted as numerals.


1ST REPEATER

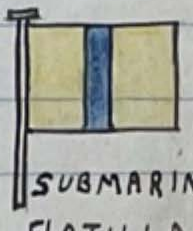

2ND REPEATER


3RD REPEATER


SQUADRON


DIVISION


TORPEDO FLOTILLA


SUBMARINE FLOTILLA

1st Repeater

2nd Repeater

3rd Repeater

Squadron

Division

Torpedo Flotilla

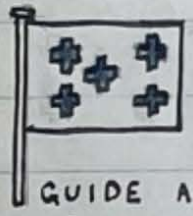
Submarine Flotilla

DANGER AND DESIGNATOR

Danger and Designator Flag.

1. Hoisted alone indicates danger ahead.

2. Hoisted over signal designates certain ships, persons or thing.



GUIDE AND GUARD

Guide and Guard.

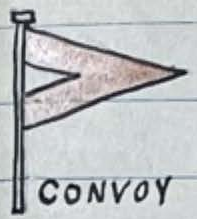
1. Hoisted at fore in port from sunrise to sunset by vessel that has the guard duty (except by flagships or vessel of senior officer present) from sunset to sunrise a red truck light will be displayed at fore truck.

2. In bows of boats doing guard duty.

3. The guard flag hoisted under a ships' distinguishing pennant, calls the guard boat alongside; at night the red light is displayed after the call.

4. Hoisted by ship in formation when under way signifies that that ship is the guide.

5. Under way and in formation, guide flag under the ships' distinguishing pennant designates her as a guide; over a distinguishing pennant indicates that she is no longer guide; it is answered by the hoisting or hauling down of the guide flag.


CONVOY AND POSITION

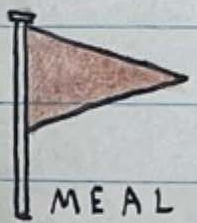
Convoy and Position Pennant.

1. Worn at the fore by all ships on convoy duty.

2. In formation, when hoisted half yardarm high, means temporally out of position

3. All the way up, she has again attained her position.

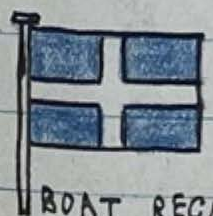
4. Under a distinguishing pennant on ship with senior officer present means to ship signaled, "You are out of position, or out of order."


MEAL PENNANT

Meal Pennant:

1. Hoisted as a single display at the port yardarm by vessels at anchor when the crew is at meals. 2. At sea or under way when hoisted at the same yardarm as the speed cone it denotes one knot faster than standard speed.

3. Under flag of a flag officer means that he is about to leave the ship.

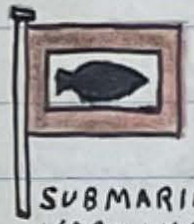

BOAT RECALL

General and Boat Recall Flag.

1. Hoisted above is a peremptory order for all boat absent to return with all speed.

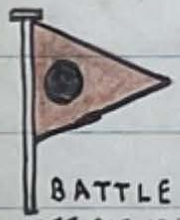
2. Hoisted under a number it is a recall of the ships' boat having that number

3. Under a boats' number it recalls that boat; over a boats number, it recalls all but that boat.

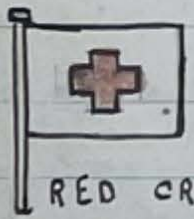

SUBMARINE WARNING

Submarine Warning.

1. Friendly submarines operating in the vacinity.

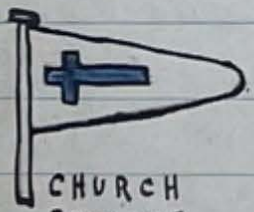

BATTLE EFFICIENCY

Battle Efficiency Pennant. Is worn at fore when at anchor, on such vessels as may have been officially designated to fly it for excellence in gunnery as determined by the results of the last annual Record Practice.


RED CROSS

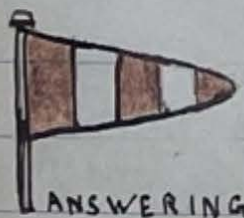
Red Cross:

1. On all Hospital Ships.


CHURCH PENNANT

Church Pennant.

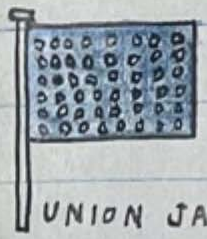
1. Hoisted over the ensign during the performance of divine service on board vessels of the U. S. Navy.


ANSWERING PENNANT

Answering Pennant.

1. When used as "Code Flag" it is to be hoisted under the ensign.

2. When used as the "Answering Pennant" it is to be hoisted at the masthead or where best seen.


UNION JACK

Union Jack.

1. When at anchor shall be flown from the jack-staff from morning colors to evening colors.

2. Hoisted at the fore, it is a signal for a pilot.

3. Hoisted at a yardarm, when a General Court Martial or Court of Inquiry is in session; in port it is hoisted and a gun fired when the court meets, and hauled down when it adjourns.

Lights

A steam vessel is any vessel proceeding under power.

If she claims to be a sailing vessel must show a black ball in forward part of boat.

Lights should be shown from sunset to sunrise.

The word "visible" means the distance the light can be seen on a dark night with a clear atmosphere.

Steamers must have a white light visible 5 miles.

Green and Red lights must be visible 2 miles.

Fishing vessels must have a white light visible 3 miles.

An Ocean Steamer under way and making way shows a 20 point white light at the masthead and should be carried not less than 20 ft. above the deck. If the beam is more than 20 ft. this light must be carried as high above the deck as the width of the beam, but not higher than 40 ft. above deck. She must have a 10 point green, (starboard) and a 10 point red (port) light, from

dead ahead to 2 points abaft the beam. When being overtaken by another vessel she shows a 12 point or flare-up light at the stern. She may also carry an afterrange 20 point white light, at least 15 ft. higher than masthead light.

An Inland Steamer carries a 20 point white light on or in front of foremast, a 10 point red and a 10 point green side light. Must also carry afterrange 32 point white light.

Sailing vessels carry 10 point red and a 10 point green sidelight and a flareup or fixed white light when overtaken.

At anchor a vessel under 150 ft. carries a 32 point white light, visible 1 mile, at foremast at least 20 ft. above deck up to 40 ft. according to size of beam. Vessels over 150 ft. carry a 32 point white light at foremast and a 32 point white light aft at least 15 ft. lower than forward light. No running side lights when at anchor.

Double ended Ferry Boats carry a 10 point red and a 10 point green side light, 2 white 32 point central range lights at same height. She may also carry a white or colored distinguishing light 15 ft. above central range lights. A single ended Ferry Boat shows lights of vessels of her type.

A vessel aground in or near a fairway by day shows 2 black balls in a vertical line, 2 ft. in diameter and 2 ft. apart. At night shows regular anchor lights and 2 red 32 point lights 6 ft. apart, from 30 to 40 ft. above deck.

Sailing Pilot Vessels on station and duty carry no side lights except on near approach of another vessel. Carries a 32 point white light at masthead and shows a flare up at intervals not exceeding 15 minutes.

Pilot Vessels (sailed motor or steam) that come alongside on duty show a 32 point white light and a combination red and green lantern, also a flare up light.

Steam Pilot Vessels show a 32 point white light and a

32 point red light, 8 ft. below at masthead and regular sidelights when under way. At anchor on station and duty puts out sailing lights.

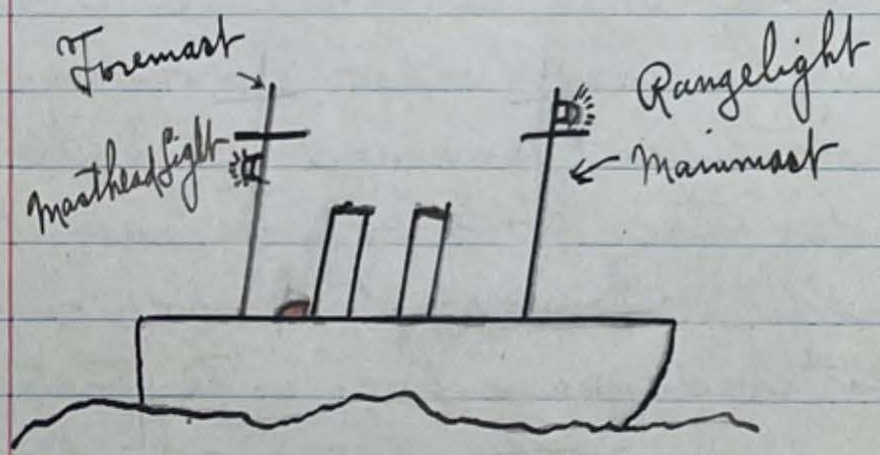
Pilot Vessels not on station and duty carries lights of ships of her type.

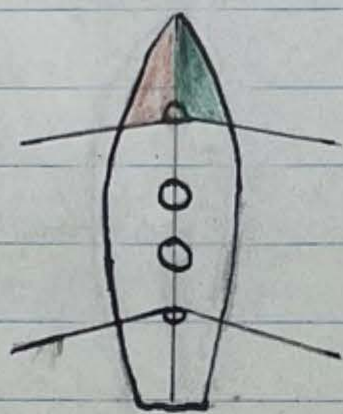
An Ocean Steamer towing has side lights, but instead of masthead has 2-20 point white lights 6 ft. apart and a 32 point white light abaft of funnel of boat she is towing. If tow is over 600 ft. (from stem of vessel towing to stem of last vessel towed) carries 3-20 point white lights, 6 ft. apart, lowest not less than 14 ft. above deck. A vessel being towed at sea shows sidelights only. A vessel towing may carry her towing lights on foremast if 20 point lights or she may carry them on masthead in which case they are 32 point lights from 3 to 6 ft. apart. Last vessel towed shows 2 white lights at least 6 ft. apart and 4 ft. above deck, thwartships.

Vessels not under command but making way

carry side lights and 2- 32 point red lights not less than 6 ft. apart, lower light being 20 ft. above deck. If not making way shows no side lights. At day carries 2 black balls.

Vessels laying cable carry 3 lights on or in front of foremast 32 pt lights, red, white and red, lower light being not less than 20 ft. above deck. By day she carries a red ball, white diamond and a red ball, three feet apart.





Rules of the Road.

Sailing Vessels.

If wind is coming on starboard side vessel is on starboard tack. If wind is on the port side vessel is on port tack.

A vessel close-hauled on port tack keeps clear of vessel close-hauled on starboard tack.

A vessel is close-hauled if sailing from 4 to 8 points from the wind.

A boat which is running free shall keep out of the way of a boat which is close-hauled.

When both are running free, with the wind on different sides the boat which has the wind on the port side shall keep out of the way of the other.

When both are running free, with the wind on the same side the boat which is to windward shall keep out of the way of the boat which is to leeward.

A boat which has the wind aft shall keep

out of the way of other boats.

When two boats under power or oars are meeting end on, or nearly end on, so as to involve risk of collision, each shall alter her course to starboard so that each may pass on the port side of the other.

When two boats under power or oars are crossing so as to involve risk of collision the boat which has the other on her starboard side shall keep out of the way of the other.

When a boat under power or oars and a boat under sail are proceeding in such directions as to involve risk of collision the boat under power or oars shall keep out of the way of the boat under sail.

Every boat whether under power, oars, or sail, when overtaking any other shall keep out of the way of the overtaken boat.

Signals.

One short blast means, "I am directing my course to starboard."

Two short blasts means, "I am directing my course to port."

Three short blasts; "My engines are going full speed astern.

A short blast is about 1 seconds duration.

A long blast is from 4 to 6 seconds duration.

In a narrow channel every boat under power or oars shall, when it is safe and practicable, keep to that side of the fairway or mid-channel which lies on the starboard side of such boat.

Whenever a boat under power is nearing a short bend or curve in a river or harbor she should give a long blast on the steam whistle.

A vessel towing, being towed, or cannot manuveur gives one prolonged and two short blasts.

Distress Signals.

Daytime:

1. A gun fied at intervals of about 1 minute.
2. Flag over Cast.
3. Distant signal - square flag with ball above or below it.
4. Continuous sounding of fog signal apparatus.

At Night:

1. A gun fired at intervals of about 1 minute.
2. Flames from a burning tar barrel, etc.
3. Rockets or shells throwing stars of any color or discription fired one by one, at intervals.
4. Continuous sounding of fog signal apparatus.

Fog Signals.

Fog signals are given every two minutes in outside waters, and every minute in inside waters.

A vessel is considered under way when not made fast, not aground, or not at anchor. A vessel is under command when she can manuver.

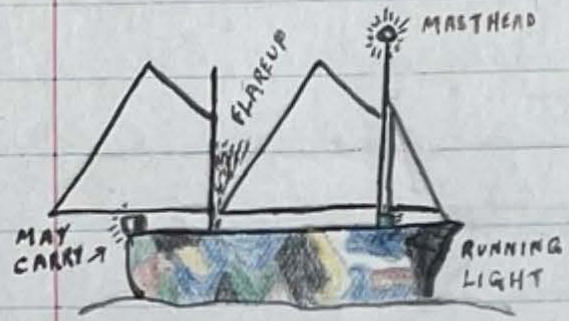
A steamer sounds fog signals on sireen or fog whistles.

A sailing vessel sounds signal on fog horn. All vessels when at anchor ring bell 5 sec. every minute.

A steam vessel under way and making way gives one prolonged blast every 2 minutes in outside waters and 1 prolonged blast every minute in inside waters.

A steam vessel under way but not making way gives 2 prolonged blasts every 2 minutes in outside waters and two every minute in inside waters.

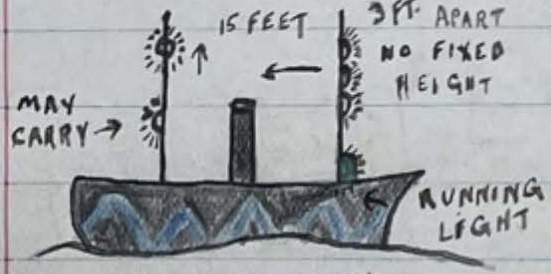
A sailing vessel on starboard tack gives one blast on fog horn at intervals not exceeding one minute. On port tack, 2 blasts. (Running free, 3 blasts.)



STEAMER UNDER WAY

STEAMER TOWING

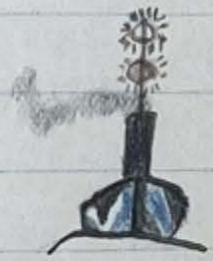
NOT UNDER CONTROL



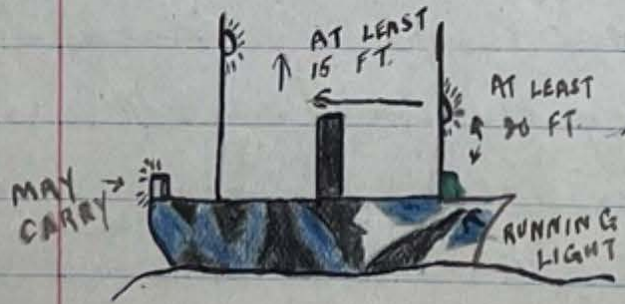
TOWING VESSEL

CABLE SHIP

STEAM PILOT ON DUTY AND UNDER WAY

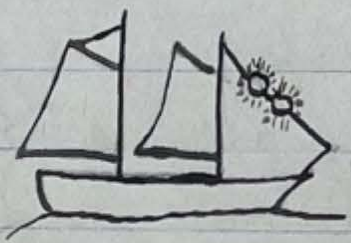


PILOT ON DUTY BUT AT ANCHOR

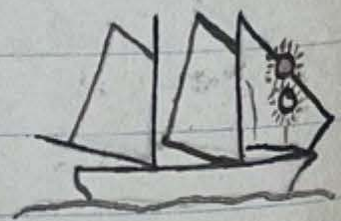


SEA GOING STEAMER

SAILING VESSEL UNDER WAY

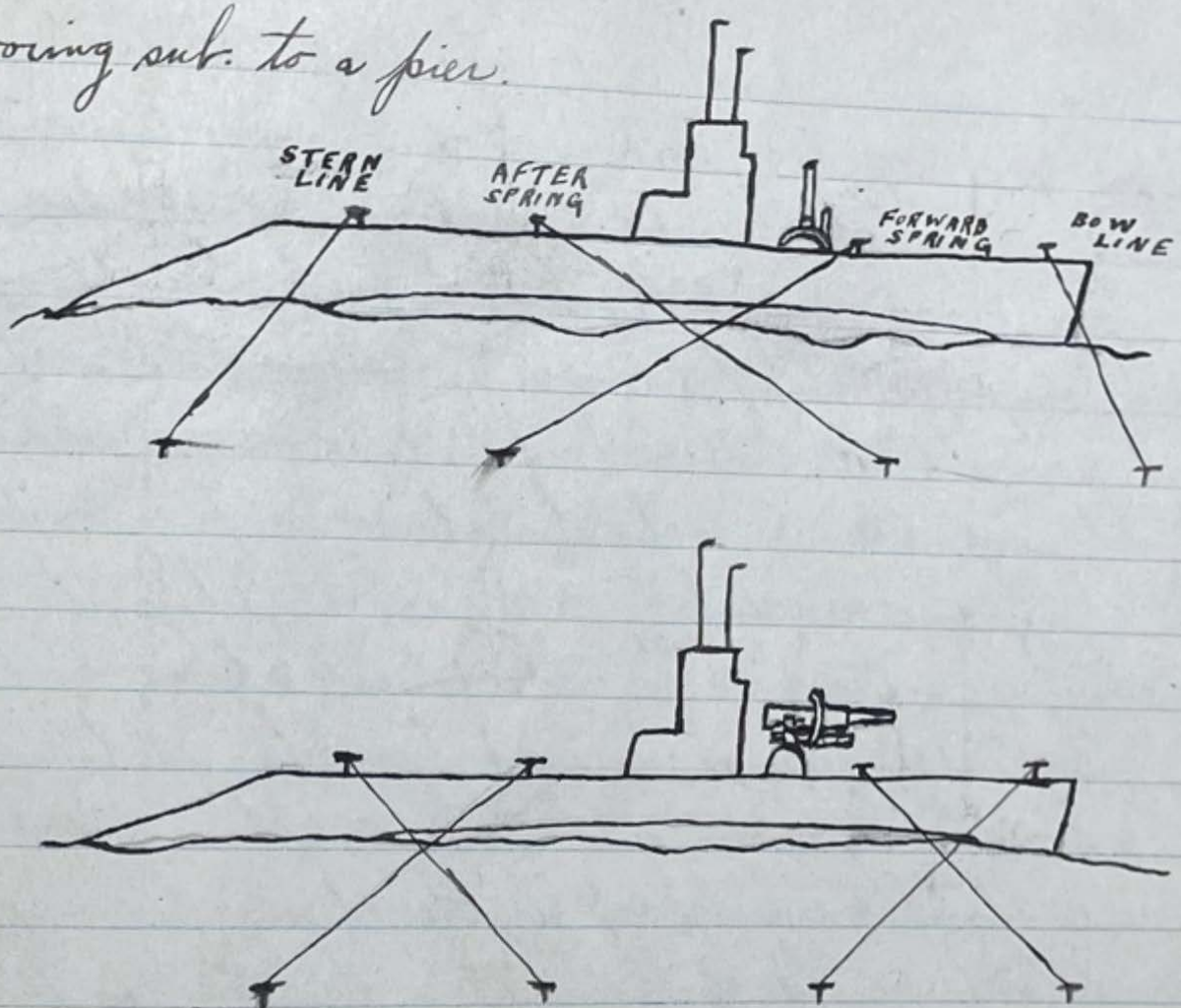


FISHING VESSEL DRIFT NETS



FISHING VESSEL TRAWLING

Mooring sub. to a pier.



Six 5 inch, or six 6 inch line carried on a sub. four are used for mooring lines and are 10 fathoms long, two of 15 fathoms used for emergency purposes.

Anchor Handling Installation.

"Lake" type submarine.

The stockless anchor of about 900 pounds weight, is stowed on a billboard housed in the forward end of the light-hinged covers. Chain cable for this anchor passes thru bullnosed fairleader at the bow and thence over a vertical idler in the superstructure deck and around a horizontal idler to the wildcat. The wildcat with the break sheave and band is portable and is secured together with the capstanhead by the T-head bolt. The capstan is portable and with the wildcat is stowed in the chain lockers, which is located between frames 6, 10½ and is provided with a non-watertight hinged cover. The chain cable consists of 60 fathoms of ¾ inch Navy standard chain. The capstan when in position is direct connected to the vertical shaft. The wildcat is connected with the vertical shaft by means of

the jaw clutch within the superstructure operated from the superstructure deck as above indicated. The wildcat freak band pivot fastens in a socket in the deck. The vertical shaft is driven from the horizontal shaft by means of spiral gears. Connected with the horizontal shaft by means of a jaw clutch which is operated both from the superstructure and in the main hull is the mushroom cable anchor drum.

The mushroom anchor which is of cast steel, lead filled, weighing about 200 pounds houses in a casing in the main hull forward. The lower part of the casing is a steel casting with a length of extra strong pipe above. The cable is a 3/4 inch diameter, extra flexible galvanized steel wire cable 50 fathoms in length which leads back over the sheave to the cable drum. A cable cutter is provided [illegible] cutter

of which are protected from salt water by a lead pipe which would be cut at the same time as the cable. The shaft is driven thru bevel gears by a vertical shaft which in turn is driven by worm gearing thru the friction clutch. The friction clutch is adjustable so that it may be regulated to transmit the required force necessary to raise the anchor and to slip when that force is exceeded, as when the anchor houses in its well. From the worm the worm shaft leads aft to a pair of sprockets and a silent chain, thence aft thru a stuffing box at bulkhead 31 to a pair of spiral gears a vertical shaft to spiral gears on the counter-shaft of the auxiliary motor to which it is connected by means of a double-jaw clutch, the other end of which engages the air compressor pinion. The hand-gear is a portable racket applied to the end of the worm shaft. A step is provided on the main hull

and a bearing at the superstructure deck so that the torpedo crane may be used for hoisting the deck anchor and placing it on the billboard.

Storm Warnings.

The warnings adapted by the U. S. Weather Bureau for announcing the approach of windstorms are as follows:

The Storm Warning (a red flag, eight feet square, with black center, three feet square) indicates that a storm of marked violence is expected.

The Red Pennant (eight feet hoist and fifteen feet fly) displayed with the flags, indicates easterly winds, that is from the N.E. to S. inclusive, and that the storm center is approaching.

The White Pennant (eight feet hoist and fifteen feet fly) displayed with the flags, indicates westerly winds, that is from N. to S.W. inclusive and that the storm center has passed.

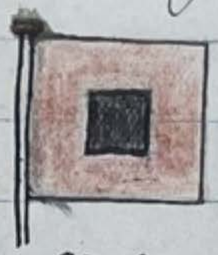
When the Red Pennant is hoisted above the storm warning, winds are expected from the northeast quadrant; when below from the southeast quadrant.

When the White Pennant is hoisted above the

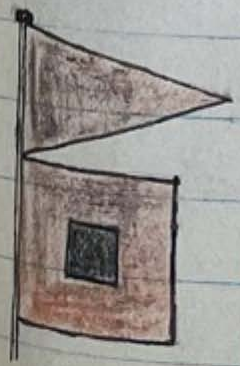
storm warning, winds are expected from the northwest quadrant; when below, from the southwest quadrant.

The Hurricane Warning (two storm-warning flags, red with black centers displayed one above the other) indicates the expected approach of a tropical hurricane or of an extremely severe and dangerous storm.

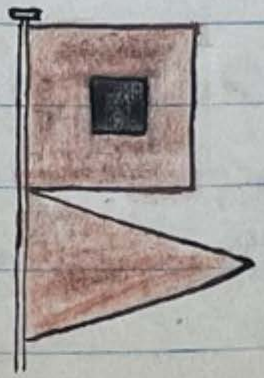
Night storm warnings - By night a red light will indicate easterly winds; a white above a red light will indicate westerly winds.



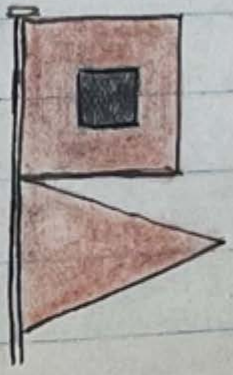
STORM WARNING



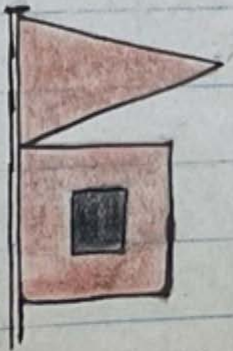
N.E. WINDS



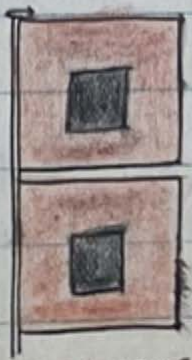
S.E. WINDS



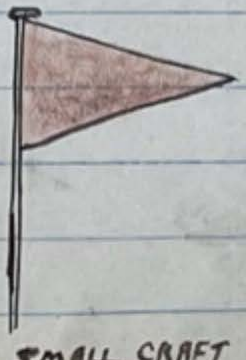
S.W. WINDS



N.W. WINDS



HURRICANE



SMALL CRAFT

Name	Rate	Address	Town
Russell S. Tatlow	Sea. 2/c	1250 East 71 st.	Lowland
J. Schmeidel	" "	199 Ellwood Ave	Akron
John Strumpfer	Sea 1st	165 Wyckoff Ave	Brooklyn
Charles Geo. Becker	Sea 2/c	28 Garden St.	Maywood,
Hubert J. McVey	Gm. 3	104 High street,	Yonkers
Weston C. Hammond	Sea	31 Cottage St.	Rutland
Thomas J. Minnaugh	Sea	40 Charles St	New Rochelle
Harold F. Porter	Sea	112 Ward Street	Watertown
George C. Foster	Sea	2 South State St	Concord
Joseph M. Breslin	Sea.	510 Greenwood Ave	Bklyn
Charles E. Sittel	Sea.	4 grant ave	Bare
W. Paul Stillman	Sea		Eatontown
J. D. Shaplaigh	Cook	405 N. 32nd St	Phila
J. A. McConnell	Sea.	435 Leeder ave.	Long Beach
L. F. Learmont	G. M 2/c	Cutler Ave.	South Meriden
Robt. L. Cadley	G. M. 3/c	1987 Broadway	New York City.
Thomas J. O'Connor	Sea	169 East 120 St	New York City
Charles W. Martin	Sea	766 Clarson Ave	B'klyn N. Y.

State	Ship or Station	Occupation.
Ohio.	U. S. S. "Goldsmith"	Stenotor.
Ohio	Sub Base	Salesman
N.Y.	" "	Boatbuilder
N.J.	" "	Secretary
N.Y.	U.S. Submarine School	Managing Newsclerk (and Long Lyric)
Vt.	U. S. S. Bumkin	Elec. Eng.
N.Y.	U.S. Submarine Base	Banker
N.Y.	U. S. Submarine Base	Insurance
N.H.	U.S. Submarine Base	Insurance
N.Y.	U.S.S. M-1	Money Lender.
Vt.	U.S. Sub. Base	Shipper
N.J.	U.S. Sub Base	Banking.
Pa.	Miscellaneous	Railroading
Cal.	U.S.S. Kansas	W.E.C. Elect.
Conn.	U.S.S. "Hardly Able"	Construction
N.Y.	U.S.S. Simplicity	Executive.
N.Y.	U. S. Submarine Base	Bank Teller
N.Y.	~~U.S.S. Daygoods~~ (Sub Base	Ribbon Salesman

Name	Rate	Address	Town
August H. Heine	Sea	142 Steuben St.	Syracuse
Roberta. O'Donnell (Beauty)	Sea	8 Taft St	Dorchester
Joseph L. Thibodeau	S M 3c	11 Greenville Ave.	Providence
Albert S. Terhune	Sea	259 Fair St.	Paterson
Robert M. Ball	Sea	356 Glenwood Ave	East Orange
E. Dawkins	G. M 3.	142 Underwood St.	Brklyn. *
Warren A. Anderson	G. M 3/c	11 Ridge Road	Waverly Mass
Lester R. Churchill	Sea	84 Ravine ave	Yonkers
Earl L. Edwards	G. M. 3/c	19 Sassafras St.	Providence
Samuel B. Baldin	Sea	Clinton ave	Smoky
Walter H. Coughlin	Sea	61 Preston St.	Hartford, Conn.
A. B. Cottine	Sea.	3103 E. Fremont Ave.	New York
G. D. Ravenath	Sea	717 Forest Ave	Brooklyn
David W Blaine	Sea.	Main St.	Chester
Raymond Elwood Thatcher	Sea	114 Sheridan Rd	Winnetka
E. A. Cross	Sea	17 Battery Place	New York City
G. W. Yates	Sea	402. 4th St	Brooklyn
Harold J. Black	Sea.	1346 Hyde St	San Francisco

State	Ship or Station	Occupation
N.Y.	U.S. Sub. Station.	Inspector
Mass	U.S.S. Endion	Shipper
R.I.	U.S.S. L-5	Printer.
N.J.	U.S. Sub. Base	Salesman.
N.J.	U.S. Submarine Base	Insurance
N.Y.	U.S. Submarine Base	Salesman.
Mass	U.S. Submarine Base	Lea. Salesman
N.Y.	U.S. Submarine Base	Bookkeeper.
R.I.	U.S. Submarine Base	Timekeeper
Mass.	U.S. Submarine Base	C.E. Engineer
Conn.	U.S. Sub. Base	Sign Painter
N.Y.	U.S. Sub. Base	Student at Law.
N.J.	U.S. Sub. Base	Bank Clerk
N.J.	U.S. Sub. Base	Doctor
R.I.	U.S. Sub Base	Salesman
N.Y.	US Sub Base	Importer
N.Y.	US Sub Base	Inspector
California	U.S. Submarine Base	Salesman.